No. 8130

JVC Service Manual

MODEL HR-3330E

VICTOR COMPANY OF JAPAN, LIMITED

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SECTION 1
GENERAL DESCRIPTION

1.1 INTRODUCTION

This manual provides service information for the JVC VHS Models HR-3330E. The manual describes the principles and adjustments of mechanical electrical operations for this model.
Service procedures given herein cover only field maintenance service. Adjustments which require high-level instruments, jigs and techniques are excluded, since they should be performed at the factory.

Due to design modifications the servicing procedures and data given in this manual are subject to possible change without prior notice.

VHS
PAL

Only cassettes marked VHS can be used with this video cassette recorder.

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

1.2 WARNING

WARNING

1. This set is for exclusive use with the PAL colour system (system B and G).
2. SECAM (system B and G) colour programmes might be recorded in certain areas but there is no interchangeability of these recorded cassette tapes with other PAL-VHS recorders or SECAM-VHS recorders.
3. Please use the exclusive SECAM-VHS recorder in SECAM broadcasting areas.
4. Please use only PAL prerecorded cassette tapes or PAL signals which have been recorded with the PAL-VHS system.

POWER SYSTEM

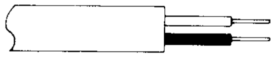
Connection to the mains supply
The operating voltage of this video cassette recorder is preset to 220 V∿ at the factory.
Before connecting to mains, check that the voltage selector on the rear panel is set to the same voltage as your local mains supply.

Adapting to local power line
The video cassette recorder operates on either 110, 127, 220 or 240 V∿. The voltage selector can be reset as follows. Turn the fuse holder and remove the holder. Pull out the voltage selector plug and reinsert it so that the proper voltage appears at the cutout.
Regarding this setting, consult your JVC dealer.

IMPORTANT (In the United Kingdom) Mains Supply (AC 240 V∿, 50 Hz only)

IMPORTANT

Do not make any connection to the Larger Terminal coded E or Green. The wires in the mains lead are coloured in accordance with following code:



If these colours do not correspond with the terminal identifications of your plug, connect as follows:
Blue wire to terminal coded N (Neutral) or coloured Black. Brown wire to terminal coded L (Live) or coloured Red.
If in doubt – consult a competent electrician.

Note: We recommend that you should disconnect the AC cord from the outlet.

IMPORTANT: It is permissible to record television programmes only in the event that third party copyrights and other rights are not violated.

POWER SWITCH

The mains switch is located on the rear connector panel. Setting this switch to OFF removes all applied power from the set including the timer clock. Switching on or off the VCR section is performed with the front panel FUNCTION switch having three positions; TIMER, OPERATE and STAND BY.

CAUTION

To prevent electric shock, do not open the cabinet. No user serviceable parts inside. Refer servicing to qualified service personnel.

1.3 FEATURES

- Recording and playback for long periods (180 min.) are possible. Operation is very easy.
- Crisp, clean pictures. AGC system assures continuous, high-quality recording and playback.
- Compact and lightweight.
- Programmes, even though not being viewed, can be recorded.
- Timer recording is possible using the built-in timer.
- Audio dubbing is possible.
- Low power consumption of 33 watts. (40 watts when automatic heating is activated.)
- Those tapes recorded on PAL-standard VHS recorders as totally interchangeable with other PAL-VHS recorders.
- Remote Pause for convenient recording.
- The bult-in timer enables switching on and off at dewired preset times during any one of 8 days in advance, including the day of setting.
- Built-in "Channel Set" signal generator for tuning in the "Video Channel" of the TV receiver.
- A TV serial which is shown at the same time daily can be recorded in succession while you are away from home (up to 3 hours of recording time using the E-180 cassette).

1.4 SPECIFICATIONS

Format : VHS PAL standard
Video recording system : Rotary, slant azimuth two-head helical scanning system
Video signal system : PAL colour (system G and B) & CCIR monochrome signals, 625 lines
Tape width : 12.7 mm
Tape speed : 23.39 mm/sec
Recording time : 180 min. (JVC E-180 cassette)
Power requirement : 110/127/220/240 V∿ selectable (to be adjusted by your dealer), 50 Hz, 40 watts (including timer)
Temperature
  Operating : 5°C to 40°C
  Storage : –20°C to 60°C
Aerial input (HR-3300EG):
  VHF Band I, channels 2–4;
  VHF Band III, channels 5–12;
  UHF Band IV/V, channels 21–69
Aerial output (HR-3300EG):
  UHF channels 32–40 (Adjustable)
Aerial input (HR-3300EK):
  UHF Band IV/V, channels 21–69
Aerial output (HR-3300EK):
  UHF channels 43–47 (Adjustable)
Video signals
  Input : 0.5 to 2.0 Vp-p/75 ohms
  Output : 1.0 Vp-p/75 ohms
  S/N ratio : more than 40 dB (Rhode and Schwarz noise meter)
  Horizontal resolution: Colour ; More than 250 lines
    Monochrome; More than 300 lines
Audio signals
  Input : Mic –67 dBs/High-impedance
    Line –20 dBs/50 k-ohms
  Output : Line 0 dBs/Less than 1 k-ohm
  S/N ratio : More than 40 dB
  Frequency response : 70 Hz – 8 kHz
Timer
  Type : 24-hour LED digital indication (8-day preset capacity)
  Timer accuracy : Excellent, locked to power line frequency
Dimensions : 453 mm (W) x 147 mm (H) x 337 mm (D)
Weight : 14 kg
Accessories provided : Power cord, Video cassette tape, Dust cover, Aerial cable, Remote control switch

Design and specifications subject to change without notice.

1.5 PRECAUTIONS

Handling and storage

- Avoid using the HR-3330E under the following conditions:
  - extremely hot, cold or humid places,
  - dusty places,
  - near appliances generating strong magnetic fields;
  - places subject to vibration, and
  - poorly ventilated places.

- Be careful of moisture condensation.
  Avoid using the HR-3330E immediately after moving from a cold place to a warm place or soon after heating a room which was cold. The water vapor in warm air will condense on the still-cold video head drum and tape guides and may cause damage to the tape and the recorder.

- Handle the HR-3330E carefully.
  - Do not block the ventilation openings.
  - Do not place anything heavy on the recorder.
  - Do not place anything which might spill and cause damage on the top cover of the recorder.
  - Utilize the accessory cover to prevent dust and dirt from accumulating on the recorder when not in use.
  - Use in horizontal (flat) position only.

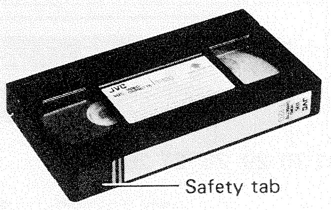
- In case of transportation.
  - Avoid violent shocks to the recorder during packing and transportation.
  - Before packing, be sure to remove the cassette from the recorder.

- In the case of malfunctioning or necessary maintenance for the HR-3330E.
  - Contact your local JVC dealer.
  - JVC accepts no responsibility for damage resulting from improper maintenance.

Video cassettes

- The HR-3330E employs VHS type cassettes only. E-180 for 180 minutes, E-120 for 120 minutes, E-60 for 60 minutes and E-30 for 30 minutes of recording.

- Video cassettes are equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording cannot be performed. If you wish to record on a cassette whose tab has already been removed, use adhesive tape to block the slot.



- Avoid exposing the cassettes to direct sunlight. Keep then away from heaters.

- Avoid extreme humidity, violent vibrations or shocks, strong magnetic fields (near a motor, transformer or a magnet) and dusty places.

- Place the cassettes in cassette cases and position vertically.

Moisture condensation

- If you pour a cold liquid into a glass water vapor in the air will condense on the surface of the glass. This is called moisture condensation.

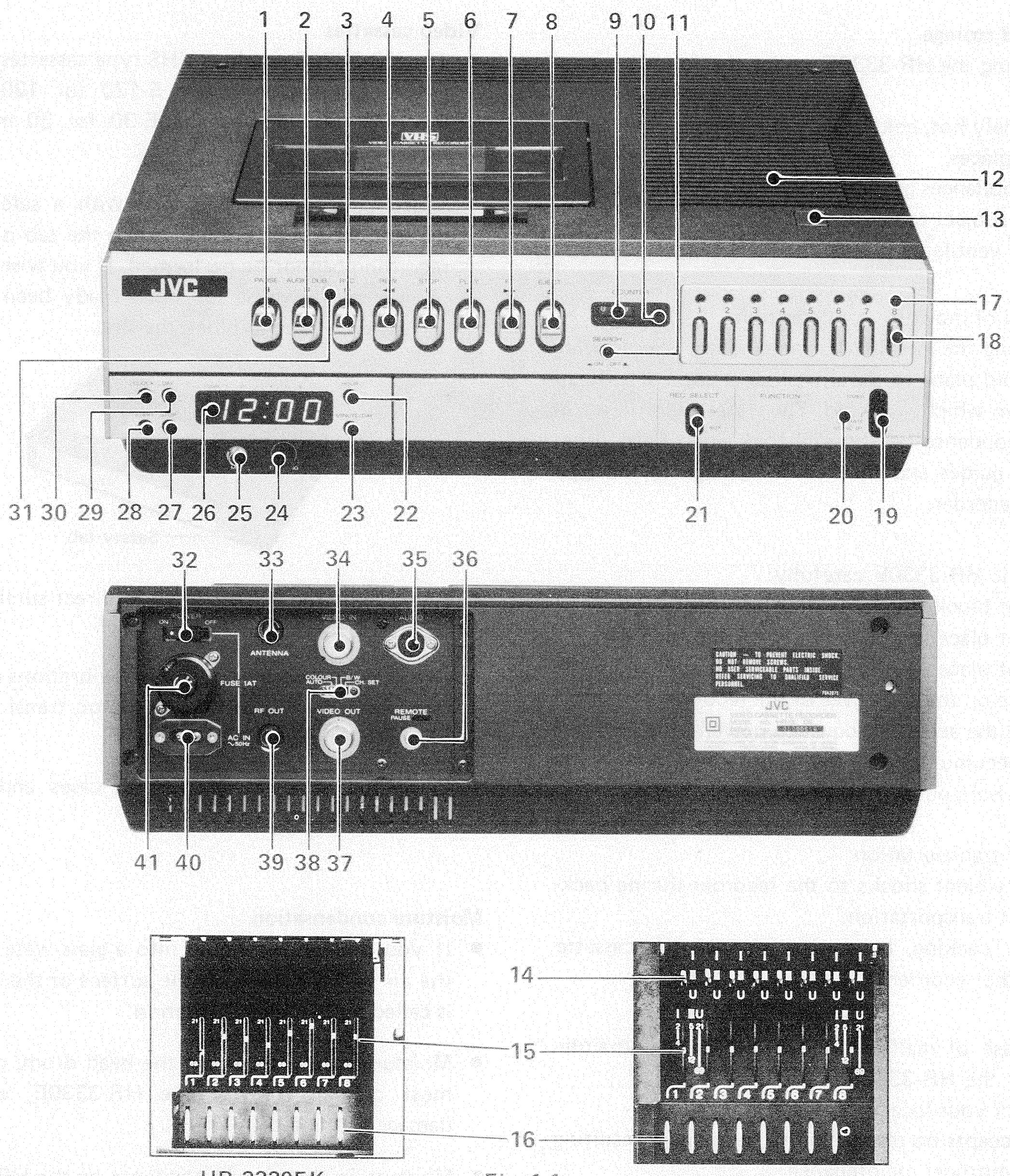
- Moisture condensation on the head drum, one of the most crucial parts of the HR-3330E, will cause damage to the tape.

- Moisture in the air will condense on the HR-3330EG when you move the unit from a cold place to a warm place, after heating a cold room or under extremely humid conditions.

- Should the PLAY key return to its previous position by itself right after being depressed, the cause may be moisture condensation. If such is the case, repeat the FF and REW operations.

- The HR-3330E is equipped with a moisture condensation prevention circuit. This circuit operates. Only when the rear panel POWER switch is turned ON.

1.6 CONTROLS AND CONNECTORS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JVC
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ANTENNA
RF OUT
VIDEO OUT
REMOTE
FUSE 1AT
AC IN
14
15
16

HR-3330EK

Fig. 1-1

HR-3330EG

1. **PAUSE key**
   Depress to stop the tape temporarily during recording or playback.
2. **AUDIO DUB key**
   Depress together with the PLAY key to record sounds on a pre-recorded tape.
3. **REC key**
   Depress together with the PLAY key for video and audio recording. (Sounds are also recorded simultaneously.) Depress only the REC key to monitor signals which you are going to record.
4. **REW key**
   Depress to rewind the tape.
5. **STOP key**
   Depress to stop the tape.
6. **PLAY key**
   Depress to play back the tape. Depress together with the REC key for recording.
7. **FF key**
   Depress to fast-forward the tape.
8. **EJECT key**
   Depress to open the cassette holder.
9. **Tape COUNTER**
   Convenient in finding the starting point of a desired part of the tape.
10. **Counter rest button**
    Depress to rest the counter to "000".
11. **SEARCH button**
    With this button depressed, the tape stops automatically when the counter reaches "999" during rewinding.

12. **Pre-tuning control compartment cover**
Opening the cover makes accessible the built-in electronic tuner pretuning controls.

13. **Compartment cover release tab**
Press to open the cover. See pages 1-7 and 1-9.

14. **VHF/UHF band selectors**
A three-position switch for selecting the VHF low channels (channel 2 to 4), VHF high channels (channel 5 to 12) and UHF channels (channel 21–69) is provided for 8 separate channels.

15. **Pre-tuning indicators**
Indicate the channel to which each programme selector is tuned.

16. **Pre-tuning controls**
Turn in either direction to tune in 8 different television stations.

17. **Programme indicator lamps**
The green LED's indicate which programme you are recording.

18. **Pushbutton programme selectors**
Press for reception from stations pre-tuned by means of the pre-tuning controls.

19. **FUNCTION switch**
Set the OPEFATE for switching on the recorder and to STAND BY when you are not using the recorder, Set the TIMER for recording while away or after you fall asleep.

20. **Indicator lamp**
Lights when the FUNCTION switch is in the OPERATE position or when the recorder is in the record or playback mode with the FUNCTION switch set at TIMER.

21. **REC SELECT switch**
Set to TV recording from the built-in tuner. Set to AUX for video recording from a camera or other sources.

22. **HOUR button**
For setting the hour indication to the correct time and the timer to the switch-on/off time.

23. **MINUTE/DAY button**
For setting the minute indication to the correct time and the timer to the swich-on/off time. Also use to set to the preselected day.

24. **TRACKING control**
Permits picture adjustment during playback.

26. **Clock dial**
24-Hour time indication.

25. **MIC jack**
Connect a microphone for audio dubbing.

27. **STOP set button**
For setting the power switch-off time.

28. **START set button**
For setting the power switch-on time.

- If these buttons (STOP and START) are pressed simultaneously, the recorder which has been set for timer recording will start immediately.

29. **DAY set button**
For preselecting the day for the timer to operate in switching on.

30. **CLOCK set button**
For setting the clock time.

31. **Recording indicator lamp**
Lights when the REC or AUDIO DUB key is depressed.

32. **POWER switch**
Switching ON applies mains power to the set. To switch off the set completely, set the POWER switch to OFF. This also switches off the timer clock.

33. **ANTENNA connector**
Connect an external antenna to this connector.

34. **VIDEO IN terminal**
Connect a video camera.

35. **AUDIO input/output DIN socket**
Connect a tape recorder or other audio sources or connect the audio output line of a video camera or other video sources.

36. **PAUSE/REMOTE terminal**
The provided remote control switch can be connected here to control the pause function from a distance.

37. **VIDEO OUT terminal**
Video signals being recorded or played back are available from this terminal.

38. **VIDEO MODE switch**
This effective both for recording and playback.

AUTO:	The circuit is automatically switched or colour or black6white mode. This position is sufficient for most purposes.
COLOUR:	Set to this position when the input or playback video signal is in colour.
B/W:	Set to this position when the input or playback video signal is monochrome.
CH. SET:	Set to this position when tuning in the TV's "Video channel".

39. **RF OUT connector**
Connect to the antenna connector of a TV receiver through the aerial cable provided.

40. **AC IN socket**
Connect the AC power cord (provided) to this socket.

41. **Fuse holder/Voltage selector**
Use a 1 AT fuse. To reset the operating voltage, first remove the fuse and reinsert the voltage selector plug to its proper setting.
See "POWER SYSTEM" on page 1-1.

1.7 TIMER CLOCK SETTING

When the HR-3330E is plugged into an AC outlet and the rear panel POWER switch is turned ON, the built-in timer clock starts time-keeping.

Setting to the present time

1. While holding the CLOCK button pressed in, press the HOUR button until the correct hour indication is reached.
   - For example, press until 23:00 is reached for 11 o'clock PM.

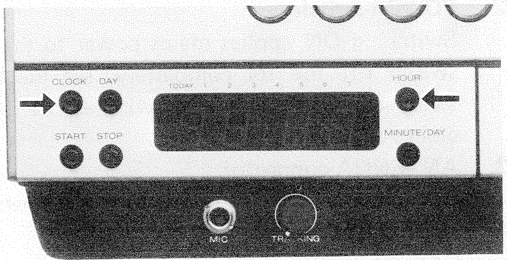

CLOCK
DAY
TODAY 1 2 3 4 5 6 7
HOUR
START
STOP
MINUTE/DAY
MIC
TRACKING

Fig. 1-2

2. While holding the CLOCK button pressed in, press in, press the MINUTE/DAY button until the correct minute indication is reached.
   - For example, press until 23:15 is reached for 11:15 PM.
   - Releasing the CLOCK button starts clock operation.

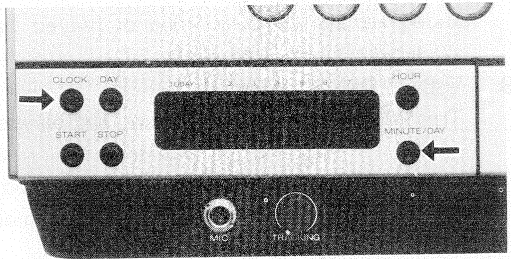

CLOCK
DAY
TODAY 1 2 3 4 5 6 7
HOUR
START
STOP
MINUTE/DAY
MIC
TRACKING

Fig. 1-3

Holding the HOUR or MINUTE button pressed continuously advances the hour or minute indication automatically. Pressing either of them once, advances it in signgle increments only.

For accurate time setting

Advance the time indication to one minute ahead of the present time. Wait for the time signal (from radio or TV) while holding the CLOCK set button pressed. Release button at the exact instant of the time signal, and the timer clock will be set accurately to the present time.

1.8 CONNECTION DIAGRAM

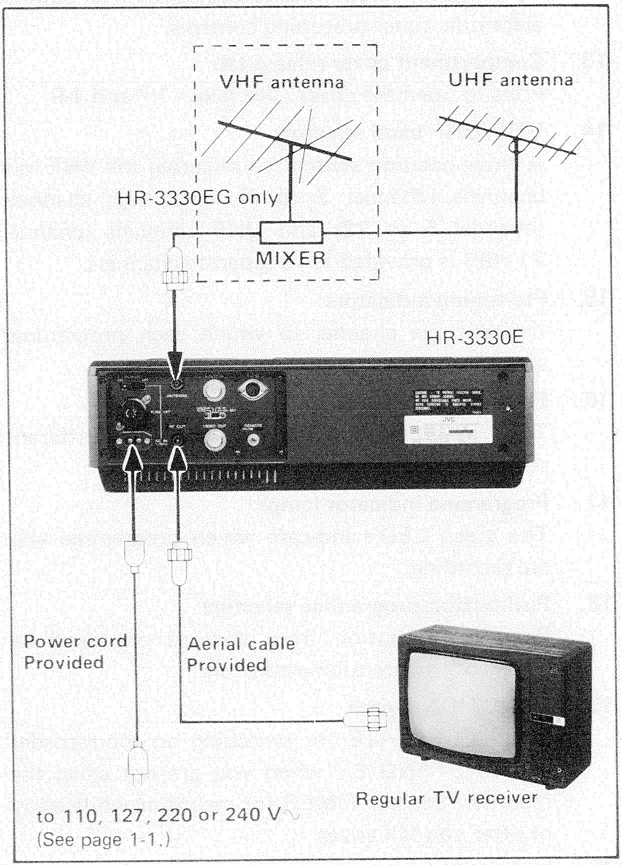

VHF antenna
UHF antenna
HR-3330EG only
MIXER
HR-3330E
Power cord
Provided
Aerial cable
Provided
Regular TV receiver
to 110, 127, 220 or 240 V∿
(See page 1-1.)

Fig. 1-4

Notes

- Connect the HR-3330E to the TV receiver using the aerial cable (devided). The TV receiver is then ready to receive TV btoadcast programmes as well as video cassette programmes from the HR-3330E.
- Remove the VHF and UHF antenna cable from the TV receiver and reconnect to the HR-3330EG as illustrated. The HR-3330EG is then ready to record off-the-air programmes.
- Remove the antenna cable from the TV receiver and reconnect to the HR-3330EK as illustrated. The HR-3330EK is then ready to record off-the-air programmes.

In areas where broadcast signals are extremely weak, connecting the HR-3330EK to the TV receiver may cause deterioration in picture quality. This is due to a single antenna being simultaneously employed for both the HR-3330EK and TV receiver. In such cases, utilize a signal booster.

IMPORTANT FOR THE UK:

To provide protection from electric shock which might result from faulty TV aerial isolation, this apparatus must always be connected to the TV receiver using the special connecting lead supplied,

which incorporates safety isolation.
Do not tamper with, or shorten this lead. Should a longer lead be required, consult your dealer.

1.9 TV RECEIVER ADJUSTMENT

The built-in RF converter permits playback of video and audio recordings through a TV receiver. The signals from the RF converter are viewed through a vacant channel not used for broadcasting. The converter channel of all units is set to UHF channel 36 prior to shipment. To obtain the best possible reproduction on your TV receiver, accurate adjustment to the RF converter output is required.

Adjust your TV receiver as follows:

1. Set the POWER switch of the HR-3330E to ON and its FUNCTION switch to OPERATE. Turn the power of the TV receiver to ON.
2. Set the video mode switch, located on the rear panel, to CH. SET (Channel Setting).
3. Adjust your TV receiver until you bring in the white signal bar as illustrated.

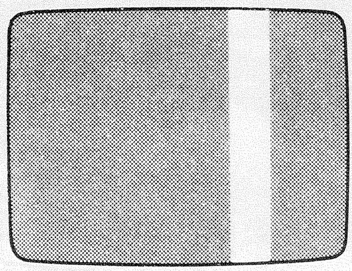


Fig. 1-5

This setting is now the Video Channel of the TV receiver to which the HR-3330E is connected.

Note: If channel 36 is employed for broadcasting, consult your JVC dealer.

- Be sure to reset the video mode switch to AUTO after tuning has been completed.
- No signal is available from the VIDEO OUT terminal while the channel set signal is being used.
- If a prerecorded VHS cassette is available, TV adjustment is also possible using it to obtain a playback picture. Insert the cassette and depress the PLAY key. Then tune the TV receiver to obtain clear pictures and sound while monitoring the playback picture on the TV screen.

1.10 BUILT-IN TELEVISION TUNER PRE-TUNING

The HR-3330E incorporates a complete television tuner with the required tuning controls. Once you have pre-tuned to eight preferred stations, you can select one of them by merely pressing one of the pushbutton programme selectors.

1. Adjust the TV receiver channel to UHF 36 (or your video channel). (Refer to "TV RECEIVER ADJUSTMENT".)

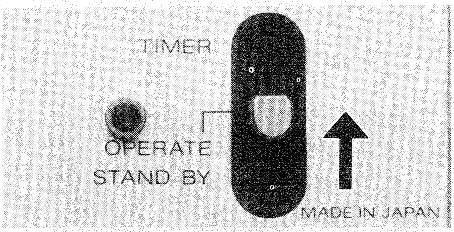


Fig. 1-6

2. Set the FUNCTION switch to OPERATE. Now the indicator lamp lights.
3. Set the REC SELECT switch to TV.

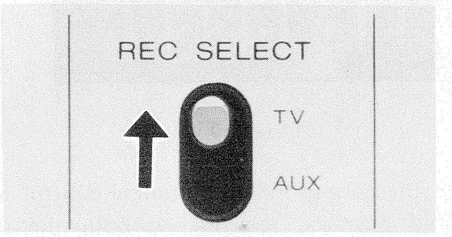


Fig. 1-7

4. Load a cassette and depress the REC key.

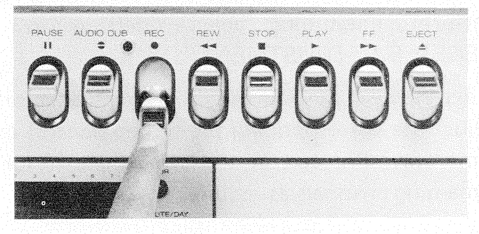


Fig. 1-8

5. Press the compartment cover release tab, and the cover will open slightly. Then lift up the cover completely.

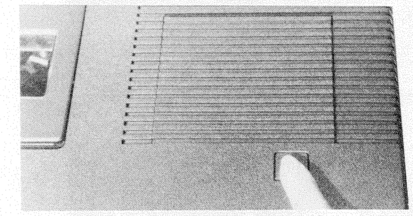


Fig. 1-9

6. Press on of the pushbutton programme selectors (for example, 3).

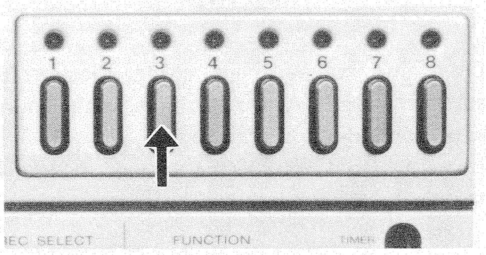


Fig. 1-10

7. Set the VHF/UHF band selector of the corresponding number (in this case, 3) to 1 (VHF low 2 – 4), III (VHF high 5 – 12) or UHF (21 – 69) according to the station to which you are going to tune.

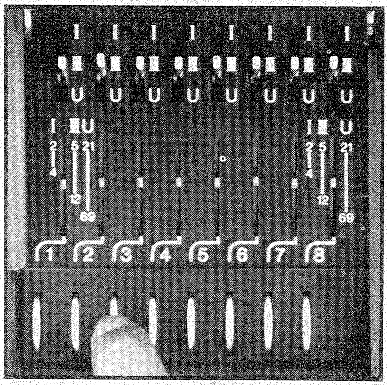


Fig. 1-11

8. Turn the corresponding pretuning control to the desired position, referring to both the tuning indicator and the monitored picture on the TV screen simultaneously.
If the picture and sound are not quite clear, perform fine-tuning again referring to "TV RECEIVER ADJUSTMENT".

9. Press the next pushbutton programme selector and adjust the corresponding pre-tuning control in the same way. Proceed in the same manner for the remaining channels as required.

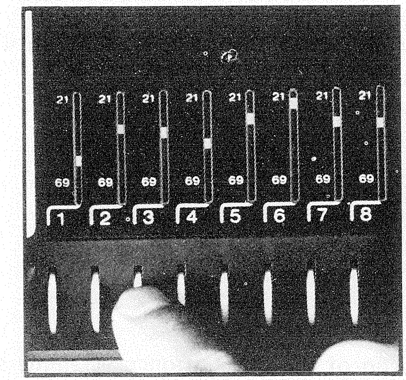


Fig. 1-12

10. Close the compartment cover. Closing it will active the AFT (Automatic Fine Tuning) function which provides optimum tuning.

11. For the Model HR-3330EK change the number of the receiving TV band.

1.11 LOADING AND UNLOADING THE VIDEO CASSETTE

Loading

1. Depress the EJECT key. The cassette holder will pop up.
2. Load the cassette in the proper manner as shown.
3. Press the holder down to lock in the cassette.

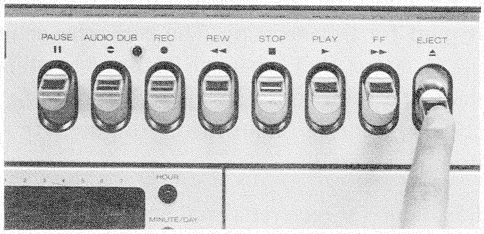


Fig. 1-13

Note:

- An inverted cassette cannot be inserted.
- Be sure the cassette is fully inserted into the holder before pressing down.

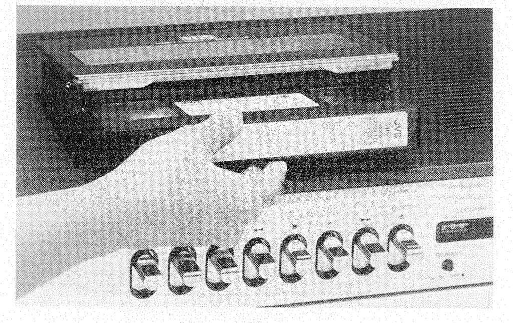


Fig. 1-14

Unloading

1. Depress the EJECT key after making certain that the HR-3330E is in the STOP mode. The cassette holder will pop up.
2. Remove the cassette.
3. Press down on the holder.

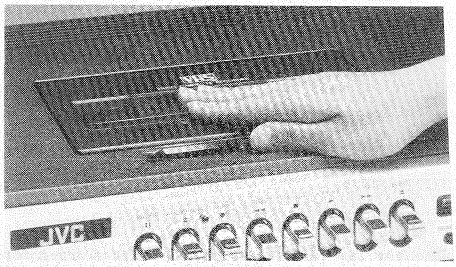


Fig. 1-15

Note

- First make certain that the HR-3330E is not in operation. If in operation, depress the STOP key and wait until the tape is completely unthreaded from the transport mechanism.

1.12 RECORDING TV PROGRAMMES

Preparation

1. Load the cassette.
2. Set the REC SELECT switfh to TV.

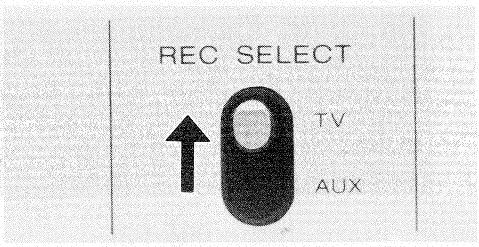

REC SELECT
TV
AUX

Fig. 1-16

3. Set the channel selector of your TV receiver to the same channel as the RF converter.
4. Press the recorder's programme slector corrsponding to the channel you wish to record.

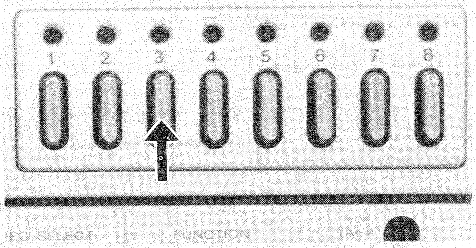

1
2
3
4
5
6
7
8
FUNCTION
TIMER

Fig. 1-17

5. Depress the REC key. The pictures will appear on the TV screen, but recording is not yet taking place.

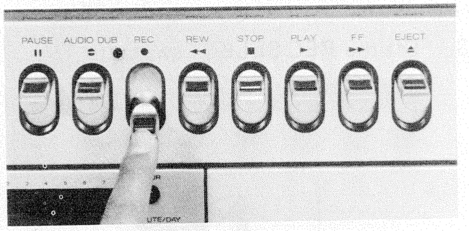

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT

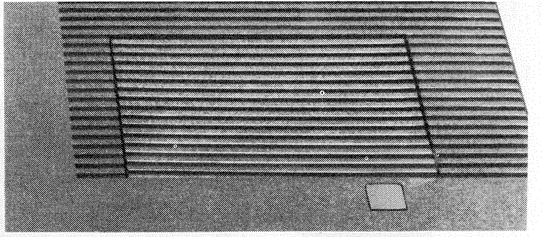
Fig. 1-18

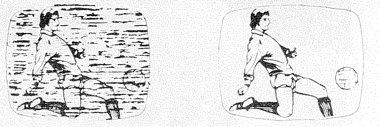
Note

- If the REC key cannot be depressed, check to see if the cassette safety tab has been removed.

Recording picture adjustment

Closing the pre-tuning control compartment cover switches on the built-in AFT (Automatic Fine Tuning) circuit. Clear pictures are normally obtained when the cover is firmly closed. However, if a clear picture or correct colour is not obtained, re-perform tuning in the manner described in "BUILT-IN TELEVION TUNER PRE-TUNING".





Snowy picture   No colour

Fig. 1-19
Fig. 1-30

Notes

- If the picture is still not clear, perform the fine tuning adjustment on the TV receiver.
- Distorted pictures or sound will be recorded if fine tuning has not been properly performed. Exercise care with this adjustment sence the recorded picture and sound cannot be adjusted later.

Recording

1. Depress the REC and PLAY keys simultaneously. Recording will start.

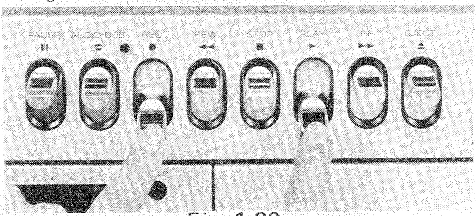

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT

Fig. 1-20

2. To skip recording of part of the programme, depress the PAUSE key. The tape will stop while in the REC mode. Depress again to restart recording.

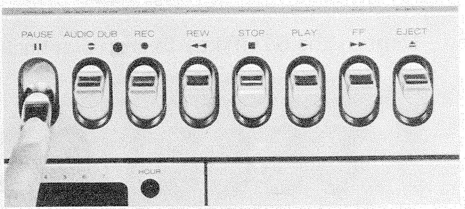

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT
HOUR

Fig. 1-21

3. To stop recording, depress the STOP key.

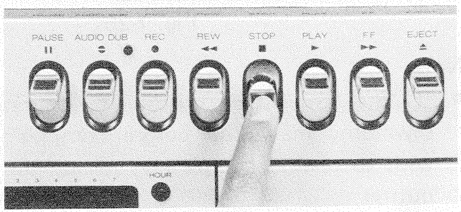

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT
HOUR

Fig. 1-22

Note

- Sound from a microphone connected to the MIC jack can be mixed with the TV sound being recorded.

1.13 PLAYBACK

1. Load the cassette.

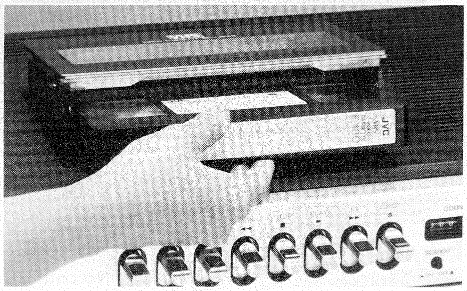


Fig. 1-23

2. Set the TV channel selector to the same channel as thr RF converter (hour video channel).
3. Depress the REW key to rewind the tpe, if necessary.

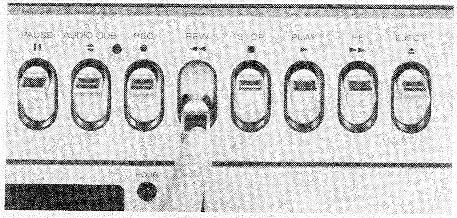

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT
HOUR

Fig. 1-24

4. Depress the PLAY key to start playback.

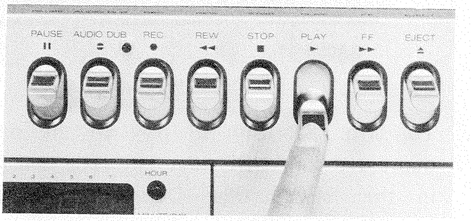

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT
HOUR

Fig. 1-25

5. Depress the STOP key to stop playback.

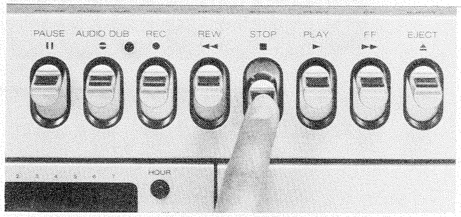

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT
HOUR

Fig. 1-26

Notes

- If the SEARCH button is depressed, tape rewinding may stop before completion. If you wish to rewind completely, release the SEARCH button.
- If the playback picture is blurred or contains noise bars, adjust the TRACKING control. Turn the knob until a click is heard, then slowly turn clockwise to adjust the picture. After use, return the knob to the original position.

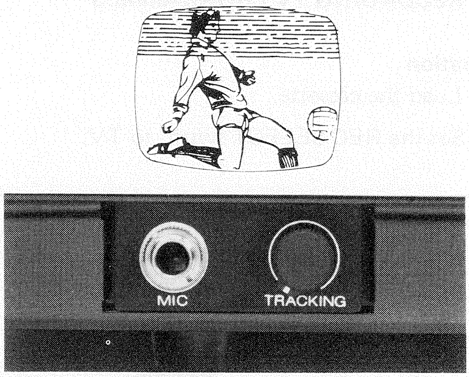

MIC
TRACKING

Fig. 1-27

1.14 RECORDING ONE PROGRAMME WHILE WATCHING ANOTHER

A programme not being viewed can be recorded while you enjoy viewing another programme.
This permits the recorded programme to be played back later at your convenience.

1. Load the cassette.
2. Press the HR-3330E programme selector corresponding to the channel you wish to record.

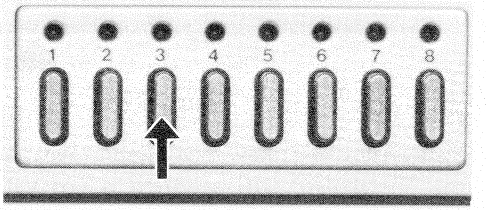


Fig. 1-28

3. Set the REC SELECT switch to TV.

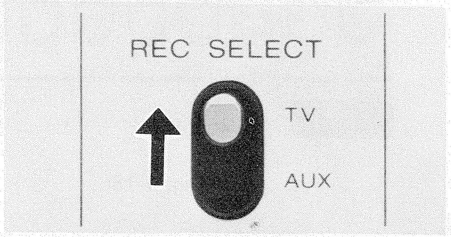

REC SELECT
TV
AUX

Fig. 1-29

4. Depress the REC and PLAY keys simultaneously.

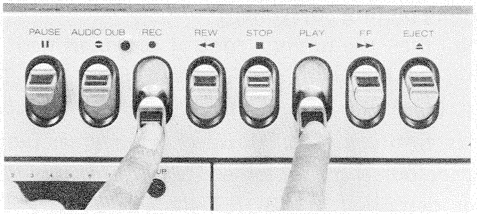

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT

Fig. 1-30

5. Set the TV channel selector to the channel you wish to view.

Note

- If a microphone is left plugged into the MIC jac, sound through the microphone is recorded at the same time.

1.15 RECORDING DURING YOUR ABSENCE

The built-in timer permits video cassette recording of off-the-air programmes while you are away, during any one of 8 days including the day of setting.

Presetting the timer for a future recording

The built-in timer permits setting of the day, switch-on time and switch of time.

When the switch-off time is reached after timer recording, the tape is unloaded from the tape transport mechanism automatically and then the power is switched off.

- First determine the number of days in advance and at what time your video system should start and what time it should switch off.

  Example:

  The recording should start after 3 days at 10.00 PM and stop at 10:30 PM.

1. While holding the DAY set button pressed, press the MINUTE/DAY button unit the day indicator lamp under the corresponding number of days (3 in this case) lights.

   (The lighting day indicator lamp advances one digit – from "Today.. to "7" – each time the MINUTE/DAY button is pressed.)

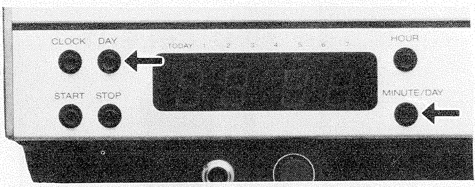


Fig. 1-31

2. Then, first set the switch-on time, and next the switch off time.

   To set the switch-on time, press the HOUR and MINUTE/DAY buttons as required while holding the START set button. In this example, obtain an indication of 22:00.

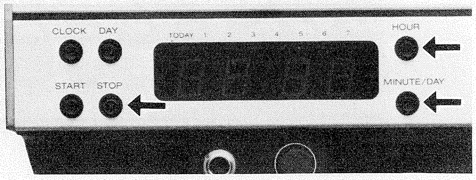


Fig. 1-32

To set the switch-off time, press the HOUR and MINUTE/DAY buttons as required while holding the STOP set button. In this ecample obtain an indication of 22:30.

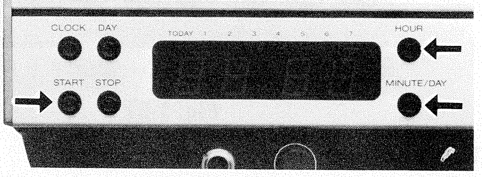


Fig. 1-33

Notes

- The day to be entered is that on which the switch-on time is set. For example, if you want the power to be switched on at 23:00 on one day and switched off at 1:00 on the next day, you have only to set the day when the power is to be switched on. Employ the position "TODAY" if you want the power to be switched on the same day you set the timer. The switch-off time must fall within 24 hours after the switch-on time.
- Power to the time is always applied as long as the power cord is plugged into an AC outlet and the POWER switch on the rear panel is set to ON.

Setting the HR-3330E for automatic timer recording

1. Load the cassette.
2. Set the REC SELECT switch to TV.

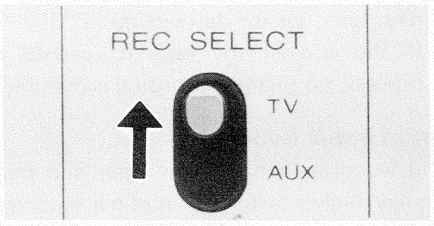


Fig. 1-34

3. Press the recorder's programme selector corresponding to the channel you wish to record.

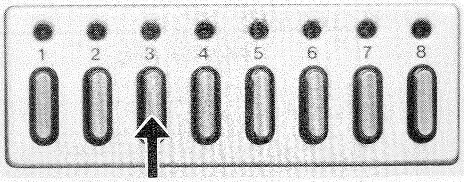


Fig. 1-35

4. Set the FUNCTION switch to TIMER.

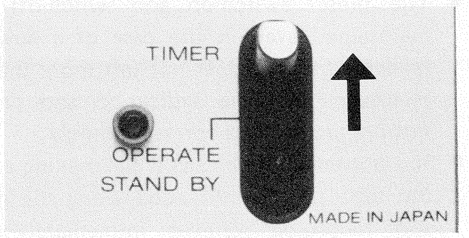


Fig. 1-36

5. Depress the REC and PLAY keys simultaneously.

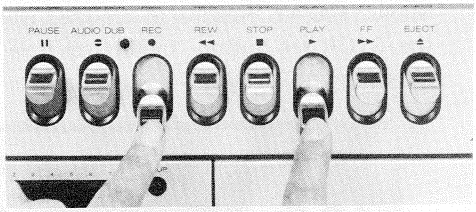

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT

Fig. 1-37

Notes

- Return the FUNCTION switch to STAND BY when you return home.
- Be careful about the 24-hour (AM/PM) time indication.
- Before setting the switch-on time, make sure that the hour/munute dial indicates the correct time.

Recording a TV programme at the same time everyday

- After completion of one cycle of switching on and off, the timer repeats this cycle at the same time everyday unless resetting of the timer is performed or unless the FUNCTION switch is released from the TIMER position.
- This facility is convenient to record a serial TV drama or news programme which is shown at the same time daily.
- When you want this repeated timer-recording process to start from the actual day of setting, set the day setting to TODAY, if it is to start 3 days later, set the day setting to "3".
- If the end of the tape is reached during this process, no further recording is possible.

In case of power failure

- The colon between the hour and minute figuers may flicker faster (5 times per second) than usual. This is not a malfunctioning of the timer, but it indicates that there has been a power failure. Re-adjusting the time restores the flickering speed to its normal (once per second) speed.

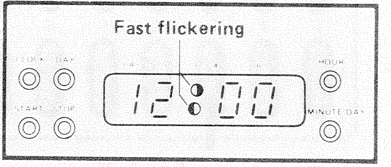

Fast flickering
CLOCK
DAY
START
STOP
12:00
HOUR
MINUTE DAY

Fig. 1-38

- The preset switch-on and switch-off times are maintained even in the case of a power failure, (provided that it does not last more than 1 hour). However, the time indication and preset timer settings are delayed correspondingly.
- If a power failure occurs while making a recording, the tape remains threaded along the head drum and recording resumes immediately upon re-application of power.

1.16 RECORDING WITH A VIDEO CAMERA

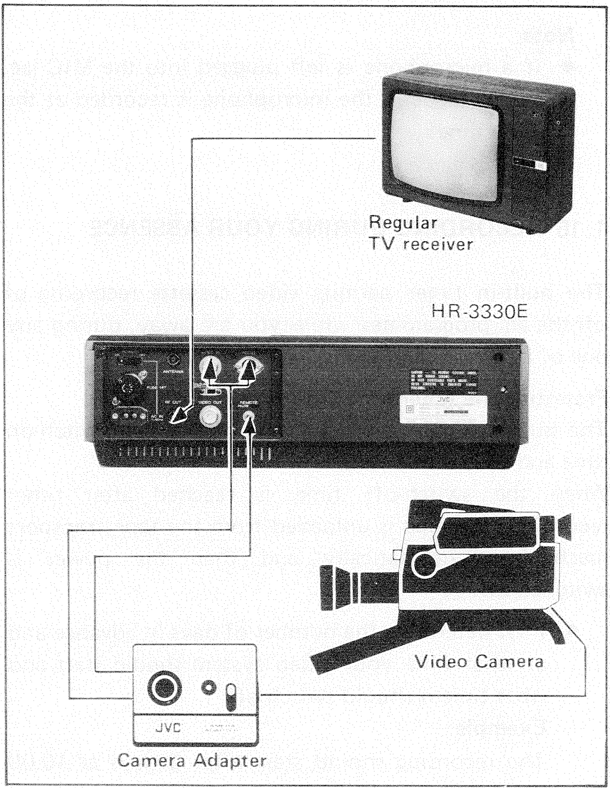

Regular
TV receiver
HR-3330E
Video Camera
JVC
Camera Adapter

Fig. 1-39

Operation

1. Turn on the HR-3330E, camera and TV receiver power switches and load the cassette to be recorded.
2. Set the TV channel selector to your video channel.
3. Set the REC SELECT switch to AUX.

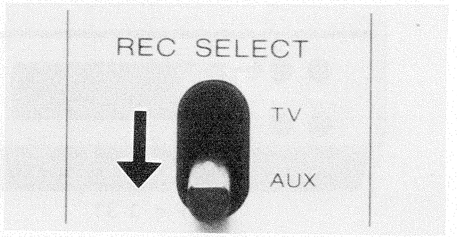

REC SELECT
TV
AUX

Fig. 1-40

4 Depress the REC key. When this key is depressed, camera picture quality can be checked on the TV screen without recording.

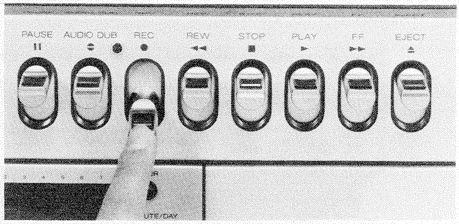

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT

Fig. 1-41

5. Depress the REC and PLAY keys simultaneously to start recording.

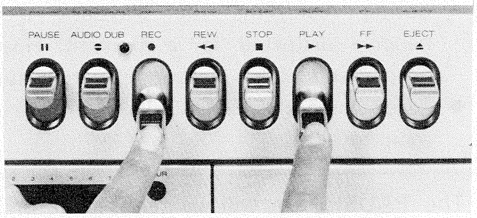

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT

Fig. 1-42

Note

- If feedback noise (whistling or howling) is heard from the TV receiver, reduce the volume or move the microphone, external or built into the camera, farther away from the TV receiver.

1.17 AUDIO DUBBING

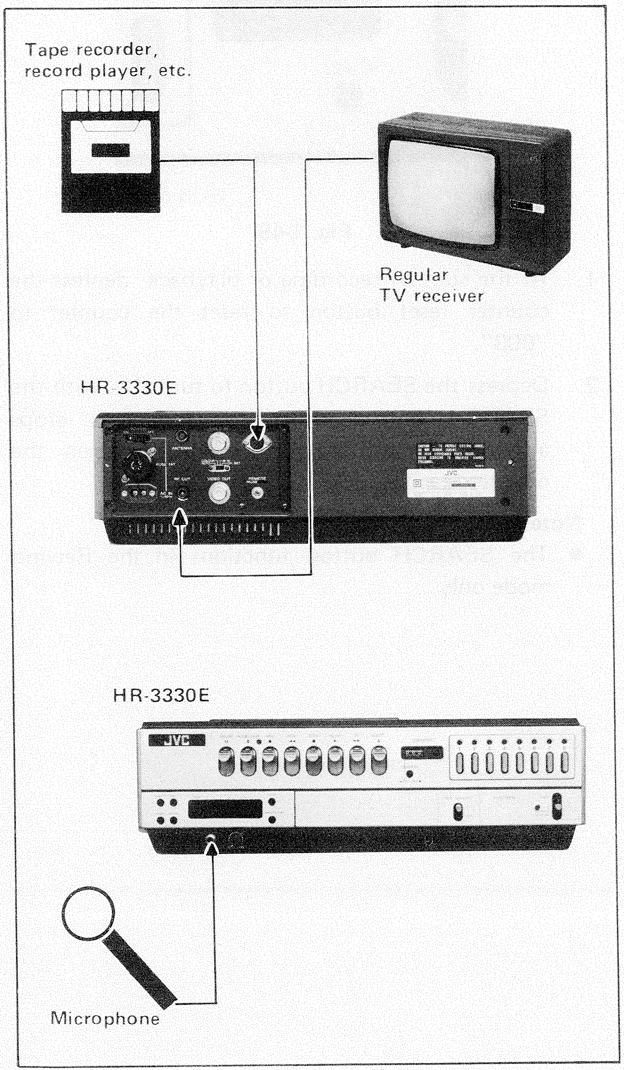

Tape recorder,
record player, etc.
Regular
TV receiver
HR 3330E
HR-3330E
Microphone

Fig. 1-43

Audio dubbing means recording a sound track on a pre-recorded cassette. Sound from a source connected to the rear panel AUDIO jack, or from a microphone connected to the front panel MIC jack, or a mixture of the two can be recorded.

1. Load the pre-recorded tape, and set the TV channel to monitor the playback picture.

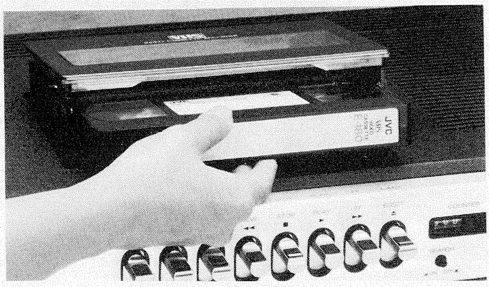


Fig. 1-44

2. Set the REC SELECT switch to AUX.

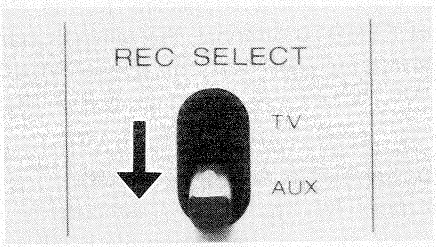

REC SELECT
TV
AUX

Fig. 1-45

3. Depress the AUDIO DUB and PLAY keys simultaneously.

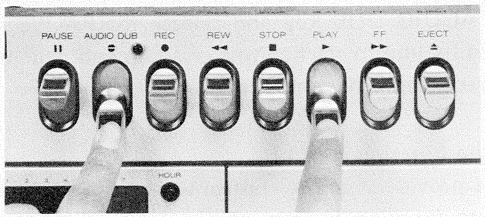

PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
FF
EJECT
HOUR

Fig. 1-46

Notes

- Use a high impedance microphone.
- If sound is recorded along with the picuture on the pre-recorded tape, it can be replaced with a new sound track by audio dubbing.
- If a whistling or howling noise is heard during audio dubbing, reduce the TV volume or move the microphone farther away. Reocrding is being performed even if sound is not heard from the TV receiver.

1.18 CONVENIENT SPECIAL FACILITIES

PAUSE key

Dpressing the PUSE key stops the tape, which is loaded around the tape transport mechanism, in the Record and Playback modes.

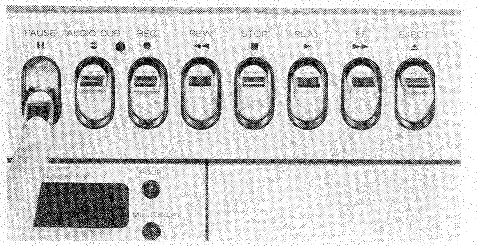


Fig. 1-47

Pause function in the Record mode

This is convenient for skipping over unwated sections of the programme being recorded. When recording with the JVC video camera connected to the HR-3330E rear panel REMOTE terminal, the camera's start/stop switch performs the same function as the PAUSE key, unless the PAUSE key is depressed on the HR-3330E.

Pause function in the Playback mode

The tape can be stopped temporarily while in the playback mode by depressing the PUSE key. The pause function also facilitates editing and audio dubbing. First play back the pre-recorded tape and depress the PAUSE key at the point from which you wish to start a new recording or sound dubbing. Then depress the REC key or AUDIO DUB key and release the PAUSE key. This permits you to start editing or audio cubbing immediately recorded programme.

Pause function control

The provided remote control switch can also operate the Pause function by remote control, connecting it to the rear panel PAUSE REMOTE terminal. When recording TV programmes, employ this convenece to temporarily stop and resume recording. You can also stop the tape during playback using this remote control switch.

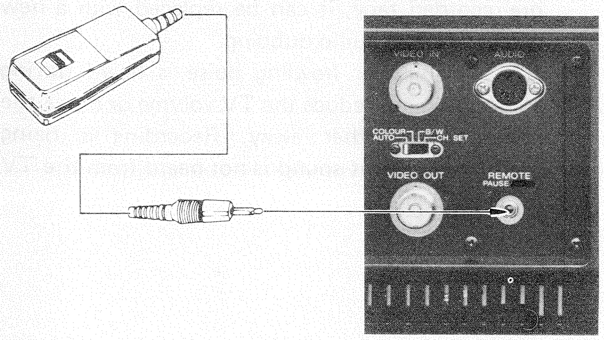


Fig. 1-48

Notes

- When the tape is stopped with the PAUSE key during recording, the playback picture may become distorted for a moment. However, this normal and a clear picture will soon return.
- After using the PAUSE key, be sure to depress again to release.

> The PAUSE key will be released automatically if it is left continuously engaged for more than 14 minutes to protect tape damage. Howevr, it is recommended that you release the PAUSE key before 10 minutes have elapsed.

SEARCH button

The SEARCH button is employed to automatically index the tape in conjunction with the tape counter.

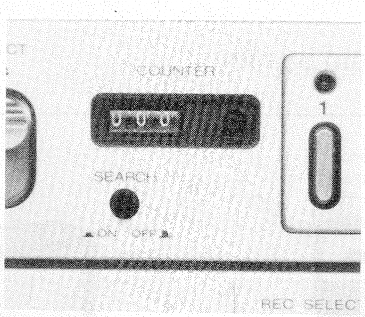


Fig. 1-49

1. At the start of recording or playback, depress the counter reset button to reset the counter to "000".
2. Depress the SEARCH button to turn ON. With the SEARCH button depressed, the tape stops automatically, after being rewound, when the counter reaches "999".

Note

- The SEARCH button functions in the Rewind mode only.

1.19 IN CASE OF DIFFICULTY

What may initially appear to be trouble is not always a real problem. Make sure first . . .

Symptoms	Check points
No power is applied to the HR-3330E.	Is HR-3330E power cord disconnected? Connect it. Is the rear panel POWER switch set to OFF? Set to ON.
The programme indicator lamp lights green but the HR-3330E fails to operate.	Is FUNCTION switch set to TIMER? Set to OPERATE.
Playback picture does not appear while the tape is running.	Is TV channel selector set to an occupied channel? Set to the RF converter channel.
Timer recording is impossible.	Has the timer been correctly set for the day, switch-on and switch-off times? Is the power switch set to TIMER?
Tape does not run in the record mode.	Is the PAUSE key depressed? Depress key again to release. Is the remote control switch connected? Disconnect or set it to OFF.
REC or AUDIO DUB key cannot be depressed.	Is the cassette improperly loaded in the compartment? Is the safety tab broken?
Tape stops in rewind mode.	Is the SEARCH button ON? Set to OFF.
Playback picture is partially noisy.	Is the TRACKING control unadjusted? Turn until a clicking sound is heard. If noise is still present, turn slowly until picture clears.
Tape will not rewind or fast forward.	Is the tape already rewound or fast forwarded to the end?
Noise such as whistling or howling (feedback) is heard from TV.	Is microphone located near the TV? Move microphone away from TV or reduce TV volume.
TV broadcasts cannot be recorded.	Is REC SELECT switch set to AUX? Set to TV.
Playback sound differend from that recorded.	Is microphone plugged in? Unplug microphone.

1.20 HEAD CLEANING

- Picture playback may become blurred or interrupted while the TV programme received is clear. This does not mean that the recorded programme has been erased.
- Dirt accumulated on the head after long periods of usage causes such troubles. In this case, head cleaning requiring highly technical care is necessary.
- For head cleaning, consult the nearest JVC dealer.

SECTION 2
MECHANISM DESCRIPTION

2.1 GENERAL

Proper positioning of the tape during recording and playback is essential for obtaining satisfactory performance. This machine therefore incorporates an automatic system for loading and unloading the tape. With power on, cassette inserted and machine in Stop mode, pressing the PLAY key (together with REC key for recording) initiates the loading sequence. Unloading becomes performed when the STOP key is pressed (or automatic stop command is produced electrically) while the machine is in Play, Record or Pause modes.

2.2 BASIC OPERATIONS

2.2.1 Video casset insertion and removal

Observe that machine is in Stop mode (STOP key depressed) and power is on, then press the EJECT key. Insert the cassette fully into the housing and close the cover by hand. To remove the cassette, press the STOP key and (after unloading is complete) press the EJECT key.

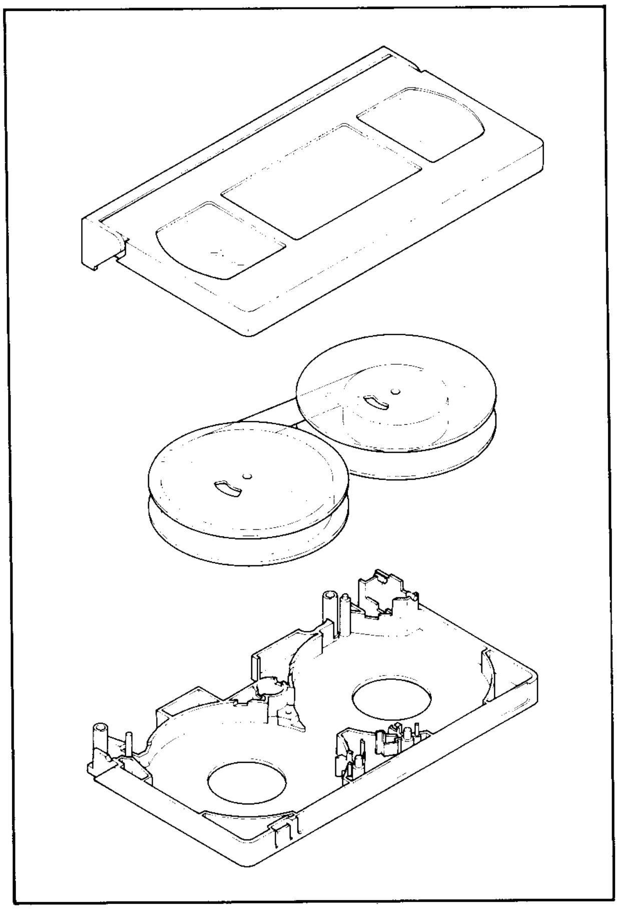


Fig. 2-1 (a) Construction of video tape cassette

2.2.2 STOP to PLAY

Insert the video cassette and press the PLAY key. The loading mechanism then functions to route the tape properly in the transport mechanism. At completion of loading, normal tape motion begins and a picture can be obtained on the TV monitor. During loading, the tape is pulled from both reels as shown by Fig. 2-1 (b), while during play, the tape travels from the supply reel to the take-up reel as shown by Fig. 2-1 (c).

2.2.3 PLAY to STOP

When the STOP key is pressed during Play mode, the tape motion stops and unloading begins. The tape becomes wound onto the supply reel during unloading.

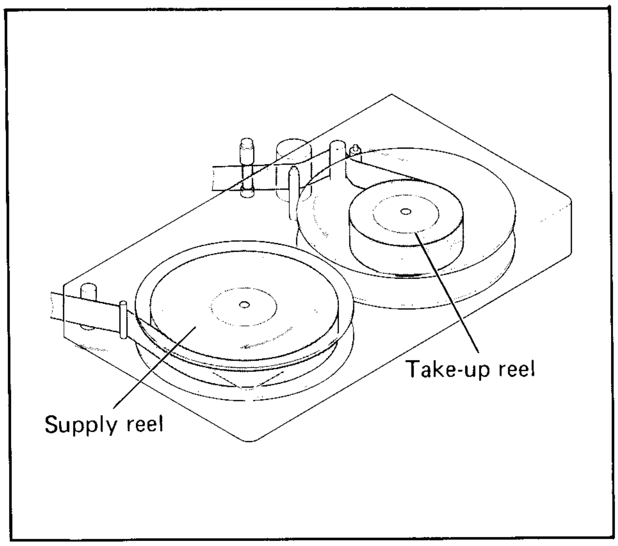


Fig. 2-1 (b) LOADING

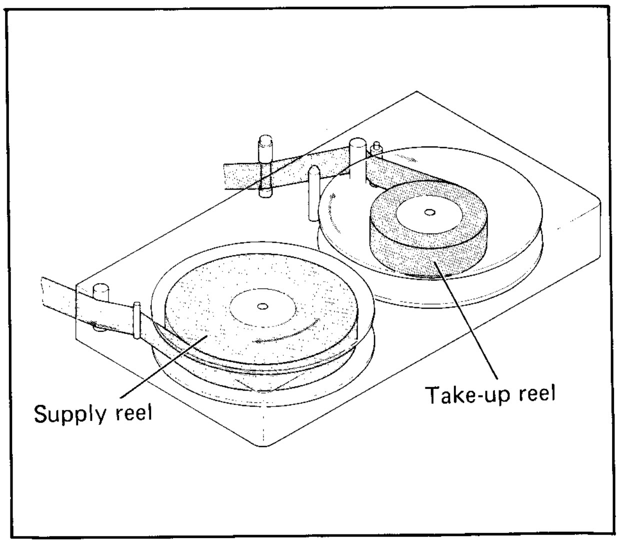


Fig. 2-1 (c) PLAY

2.2.4 STOP to REWIND (REW)

To rewind the tape, press the STOP key, then the REW key. The tape becomes rewound from the take-up reel to the supply reel (Fig. 2-2). To release the Rewind mode, press the STOP key.

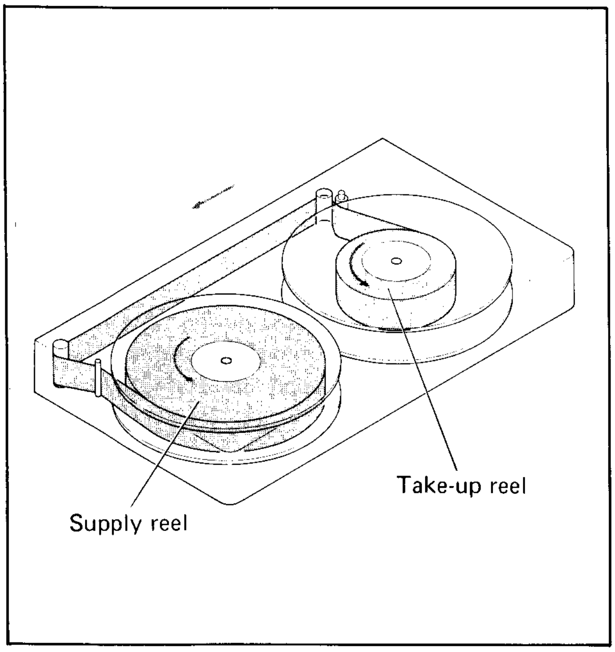


Fig. 2-2 REWIND MODE

2.2.5 STOP to FAST FORWARD (F. F.)

For fast forward, press the STOP key, then the F. F. key. The tape becomes wound rapidly from the supply reel to the take-up reel (Fig. 2-3). To release the Fast Forward mode, press the STOP key.

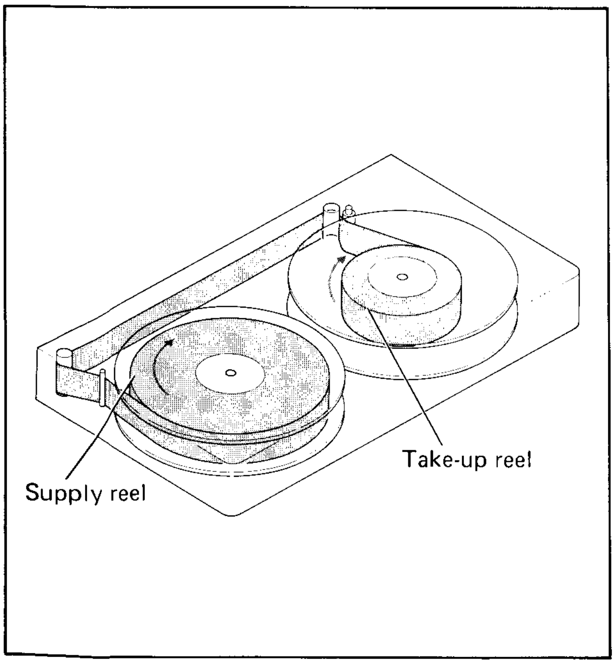


Fig. 2-3 F. F. MODE

2.2.6 Pause mode

Pressing the PAUSE key separates the pinch roller from the capstan and the take-up idler from the take-up reel disk. Tape motion thus stops. Press the PAUSE key once for Pause mode; to resume tape motion, again press the PAUSE key and release it.

2.2.7 Automatic stop system

Transparent sections are provided at each end of the cassette tape as shown in Fig. 2-4 (a) During operation, the tape is illumintated by the cassette lamp and when its light is detected by either of the two photo transistors, the automatic stop sequence becomes initiated.

1. Beginning of tape: when the beginning of the tape is reached during rewind, the transparent leader tape allows the cassette lamp light to reach the start sensor. This initiates automatic stop. At this time, additional rewind becomes inhibited. See Fig. 2-4 (b).
2. End of tape: when the transparent trailer portion of the tape is reached during play, record or fast forward, the end sensor detects the cassette lamp light as shown in Fig. 2-4 (c). Automatic stop is obtained and these modes become inhibited.
3. Since the video tape is opaque, no light reaches either sensor while tape is present, as shown in Fig. 2-4 (d). All modes are enabled at this time.

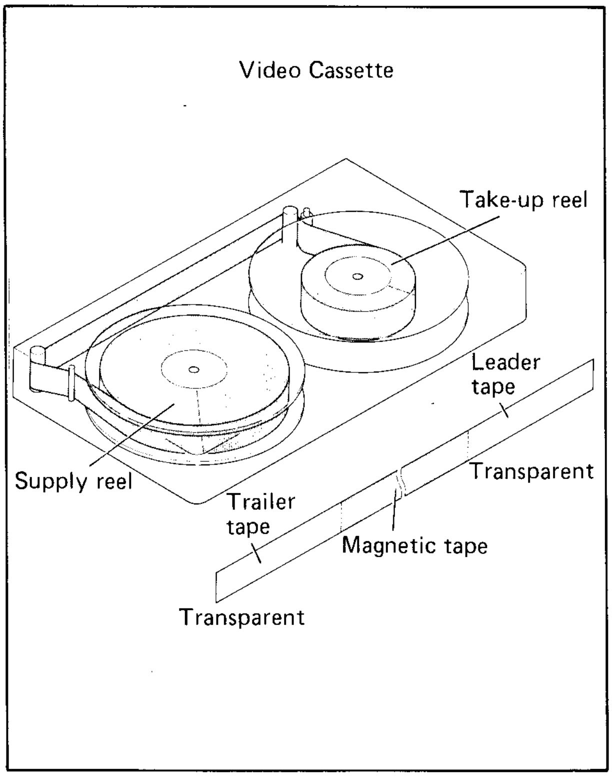


Fig. 2-4 (a)

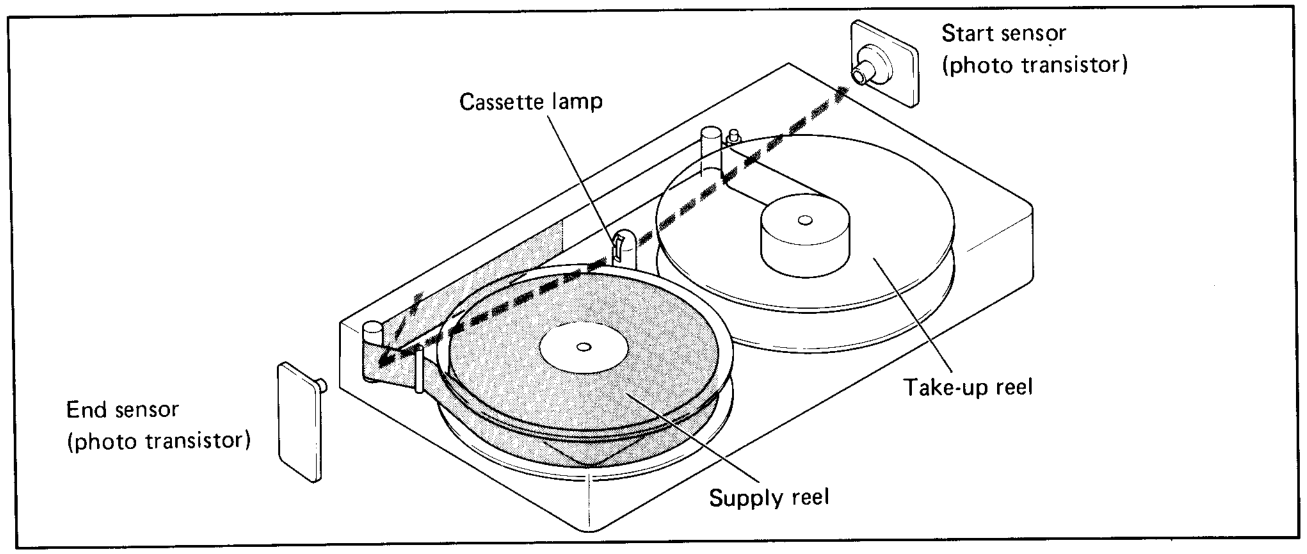

Start sensor
(photo transistor)
Cassette lamp
End sensor
(photo transistor)
Take-up reel
Supply reel

Fig. 2-4 (b) Beginning of the tape

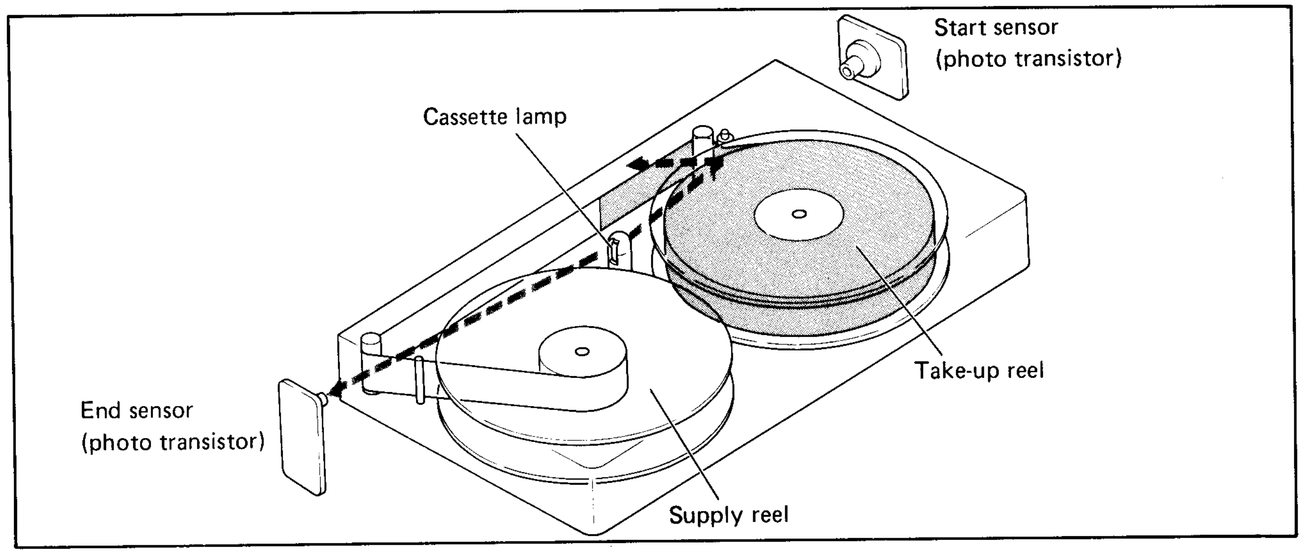

Start sensor
(photo transistor)
Cassette lamp
End sensor
(photo transistor)
Take-up reel
Supply reel

Fig. 2-4 (c) End of the tape

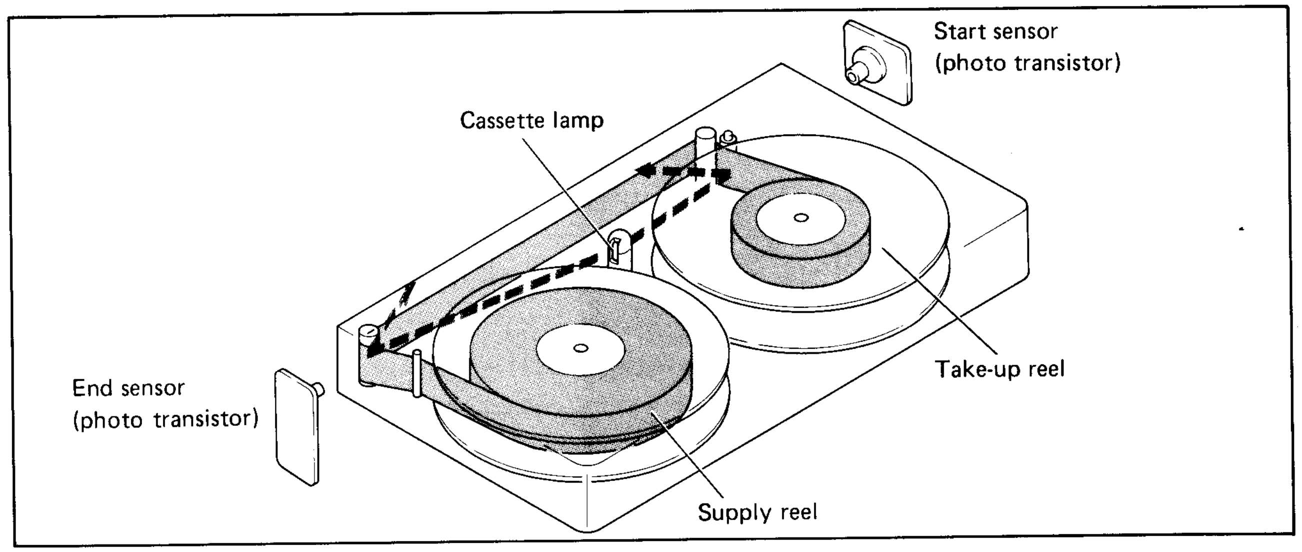

Start sensor
(photo transistor)
Cassette lamp
End sensor
(photo transistor)
Take-up reel
Supply reel

Fig. 2-4 (d) During operation

2.3 MAIN COMPONENT FUNCTIONS

2.3.1 Capstan motor

A servo circuit maintains constant rotation of the capstan DC motor (Fig. 2-5). This rotation is transferred via the relay pulley and capstan belt to the capstan flywheel. The rotation of the relay pulley goes via the reel drive belt to the take-up and rewind idlers, while rewind idler rotation is transferred to the unloading idler through the unloading idler belt.

2.3.2 Drum motor

The drum motor (Fig. 2-5) is also controlled by a servo circuit. Its rotation is transferred by the drum belt to the drum and drum flywheel.

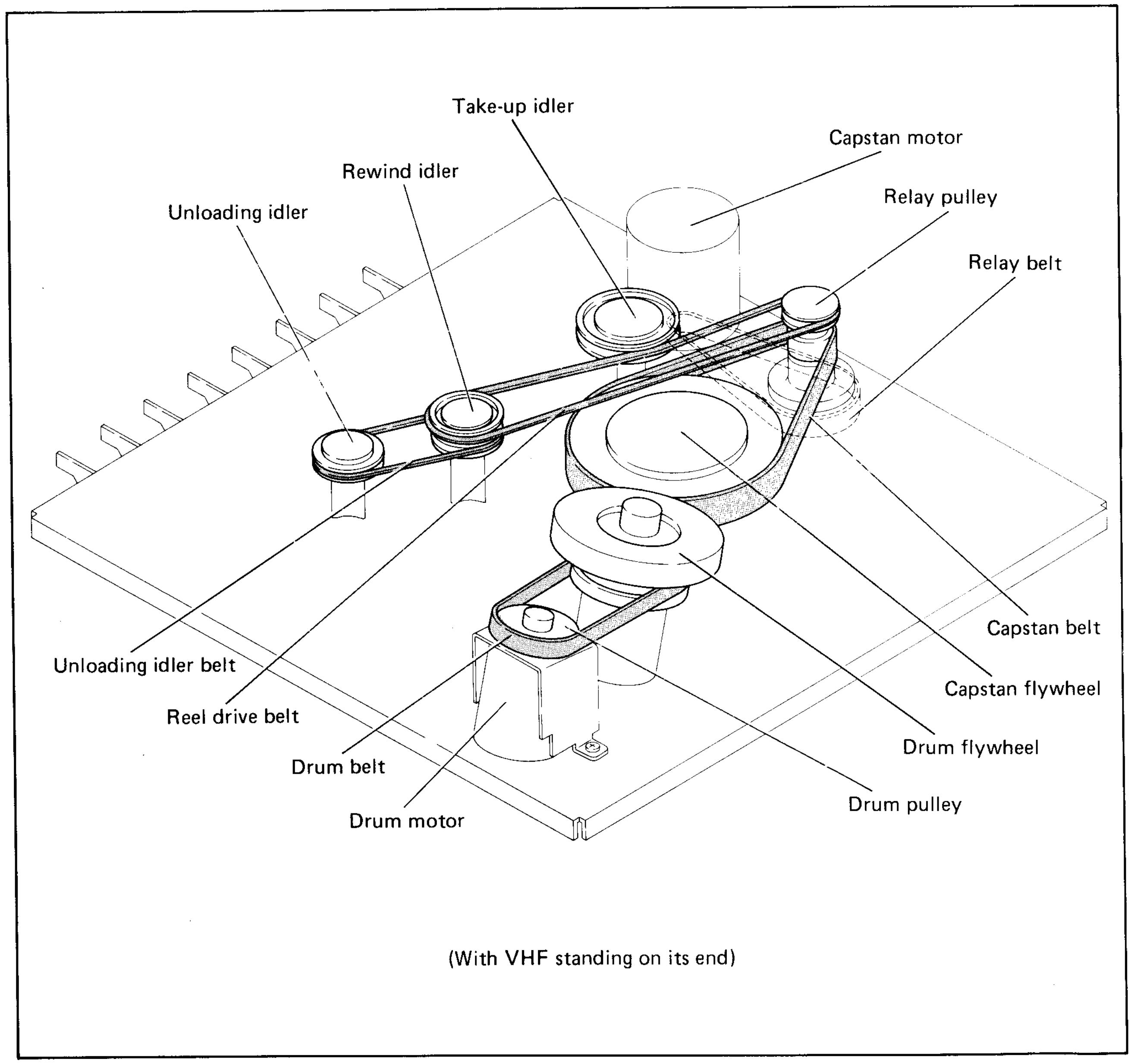
2.3.3 Stop solenoid

The automatic stop system operates the stop solenoid, which in turn releases the function keys.

2.3.4 Pause solenoid

During Play and Record modes, the pause solenoid is normally in the on position and functions to press the pinch roller ass'y against the capstan shaft and the take-up idler ass'y against the take-up reel disk.

Pressing the PAUSE key sets this solenoid to the off position, releasing the pinch roller and take-up idler assemblies. Tape motion then stops.


Take-up idler
Capstan motor
Rewind idler
Relay pulley
Unloading idler
Relay belt
Capstan belt
Unloading idler belt
Capstan flywheel
Reel drive belt
Drum flywheel
Drum belt
Drum pulley
Drum motor

(With VHF standing on its end)

Fig. 2-5 Capstan motor and drum motor drive mechanism

2.4 LAYOUT OF MAIN MECHANICAL AND ASSOCIATED PARTS
– TOP VIEW –

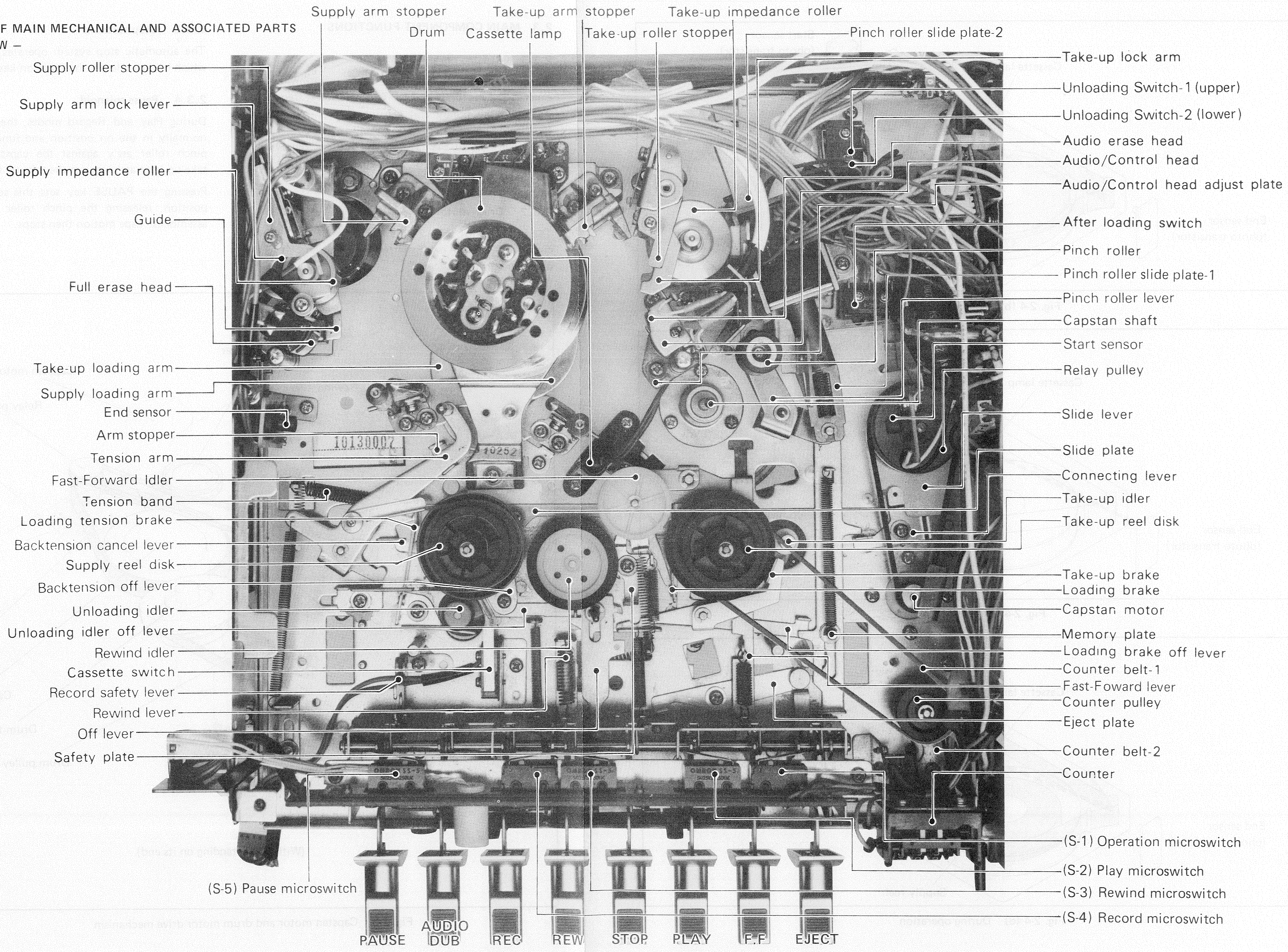

Supply arm stopper
Drum
Take-up arm stopper
Cassette lamp
Take-up impedance roller
Take-up roller stopper
Pinch roller slide plate-2
Supply roller stopper
Supply arm lock lever
Supply impedance roller
Guide
Full erase head
Take-up loading arm
Supply loading arm
End sensor
Arm stopper
Tension arm
Fast-Forward Idler
Tension band
Loading tension brake
Backtension cancel lever
Supply reel disk
Backtension off lever
Unloading idler
Unloading idler off lever
Rewind idler
Cassette switch
Record safety lever
Rewind lever
Off lever
Safety plate
(S-5) Pause microswitch
Take-up lock arm
Unloading Switch-1 (upper)
Unloading Switch-2 (lower)
Audio erase head
Audio/Control head
Audio/Control head adjust plate
After loading switch
Pinch roller
Pinch roller slide plate-1
Pinch roller lever
Capstan shaft
Start sensor
Relay pulley
Slide lever
Slide plate
Connecting lever
Take-up idler
Take-up reel disk
Take-up brake
Loading brake
Capstan motor
Memory plate
Loading brake off lever
Counter belt-1
Fast-Foward lever
Counter pulley
Eject plate
Counter belt-2
Counter
(S-1) Operation microswitch
(S-2) Play microswitch
(S-3) Rewind microswitch
(S-4) Record microswitch
10130007
10252
PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
F.F
EJECT

Fig. 2-6(a) STOP mode mechanism (TOP VIEW)

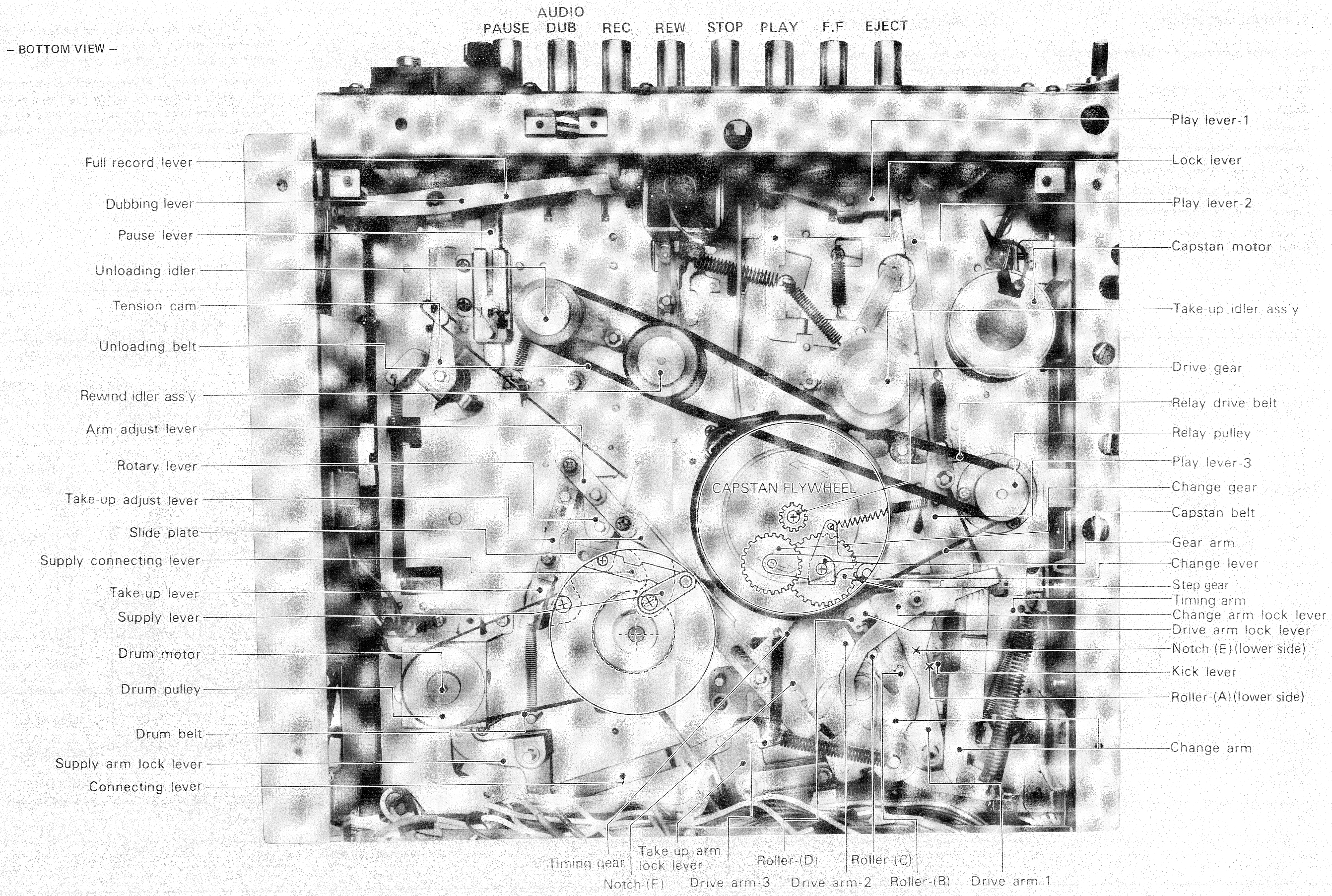

– BOTTOM VIEW –
PAUSE
AUDIO DUB
REC
REW
STOP
PLAY
F.F
EJECT
Full record lever
Dubbing lever
Pause lever
Unloading idler
Tension cam
Unloading belt
Rewind idler ass'y
Arm adjust lever
Rotary lever
Take-up adjust lever
Slide plate
Supply connecting lever
Take-up lever
Supply lever
Drum motor
Drum pulley
Drum belt
Supply arm lock lever
Connecting lever
CAPSTAN FLYWHEEL
Play lever-1
Lock lever
Play lever-2
Capstan motor
Take-up idler ass'y
Drive gear
Relay drive belt
Relay pulley
Play lever-3
Change gear
Capstan belt
Gear arm
Change lever
Step gear
Timing arm
Change arm lock lever
Drive arm lock lever
Notch-(E)(lower side)
Kick lever
Roller-(A)(lower side)
Change arm
Timing gear
Notch-(F)
Take-up arm lock lever
Drive arm-3
Roller-(D)
Drive arm-2
Roller-(C)
Roller-(B)
Drive arm-1

Fig. 2-6(b) Stop mode mechanism (BOTTOM VIEW)

2.5 STOP MODE MECHANISM

The Stop mode produces the following mechanical states:

1. All function keys are released.
2. Supply and take-up loading arms are in stop positions.
3. Unloading switches are pressed (on position).
4. Unloading idler contacts the supply reel disk.
5. Take-up brake engages the take-up reel disk.
6. Capstan and drum motors are stopped.

In this mode (and with power on) the EJECT key can be operated to insert or remove a cassette.

2.6 LOADING-1 MECHANISM

Refer to Fig. 2-7. When the PLAY key is pressed in the Stop mode, play levers 1, 2 and 3 move in the directions shown by arrows a, b and c in Fig. 2-7. As play lever 3 moves, stud D of the change lever becomes raised by the groove of play lever 3 and the change lever turns counterclockwise. The gear arm becomes free and spring-2 tension pulls the change gear clockwise ⓔ to where it engages with the drive gear on the capstan shaft.

Capstan motor rotation then becomes transferred in the route: capstan motor – relay pulley – capstan flywheel – drive gear – change gear – step gear – timing gear. At this point, the timing gear rotates clockwise.

Roller A of the timing arm normally rests in notch F. When the timing gear begins rotating, the roller separates from the timing gear and the timing arm moves in direction ⓖ. The timing arm then becomes locked by the edge of the timing gear.

A rod connects the change arm lock lever to play lever 2, which pulls the change arm lock lever in direction ⓗ. At this point, the timing gear continues clockwise rotation.

Refer to Fig. 2-8. Pressing the PLAY key operates microswitches S2, S1 and S4. At this time, both capstan and drum DC motors begin rotating. The off lever moves in direction ⓐ and via the unloading idler off lever, releases the unloading idler from the supply reel disk. As the lower timing arm (Fig. 2-7) moves, the slide lever (Fig. 2-8) moves in direction ⓔ and the connecting lever, memory plate and pinch roller slide plate respectively move in directions ⓕ, ⓖ and ⓗ. As a result, the pinch roller and take-up roller stopper mechanism move to standby positions ⓘ and ⓚ. Unloading switches 1 and 2 (S7 & S8) are off at this time.

Clockwise rotation ⓕ of the connecting lever moves the slide plate in direction ⓙ. Loading tension and loading brakes become applied to the supply and take-up reel disks. Spring tension moves the safety plate in direction ⓛ to lock the off lever.

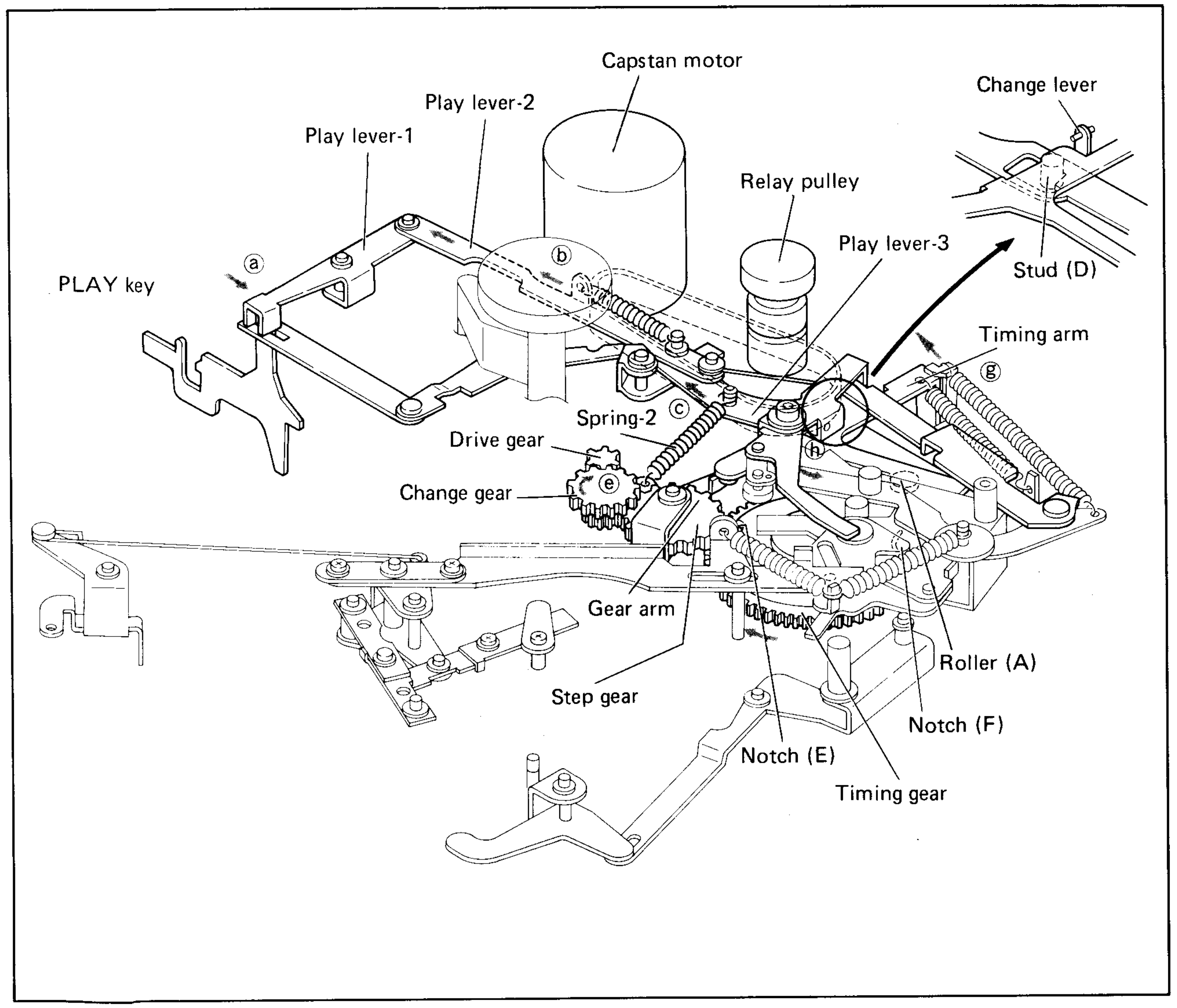

Capstan motor
Change lever
Play lever-2
Play lever-1
Relay pulley
Play lever-3
Stud (D)
PLAY key
ⓐ
ⓑ
ⓒ
Timing arm
ⓖ
Spring-2
Drive gear
Change gear
ⓔ
ⓗ
Gear arm
Roller (A)
Step gear
Notch (F)
Notch (E)
Timing gear

Fig. 2-7 Loading-1 mechanism (Bottom view)

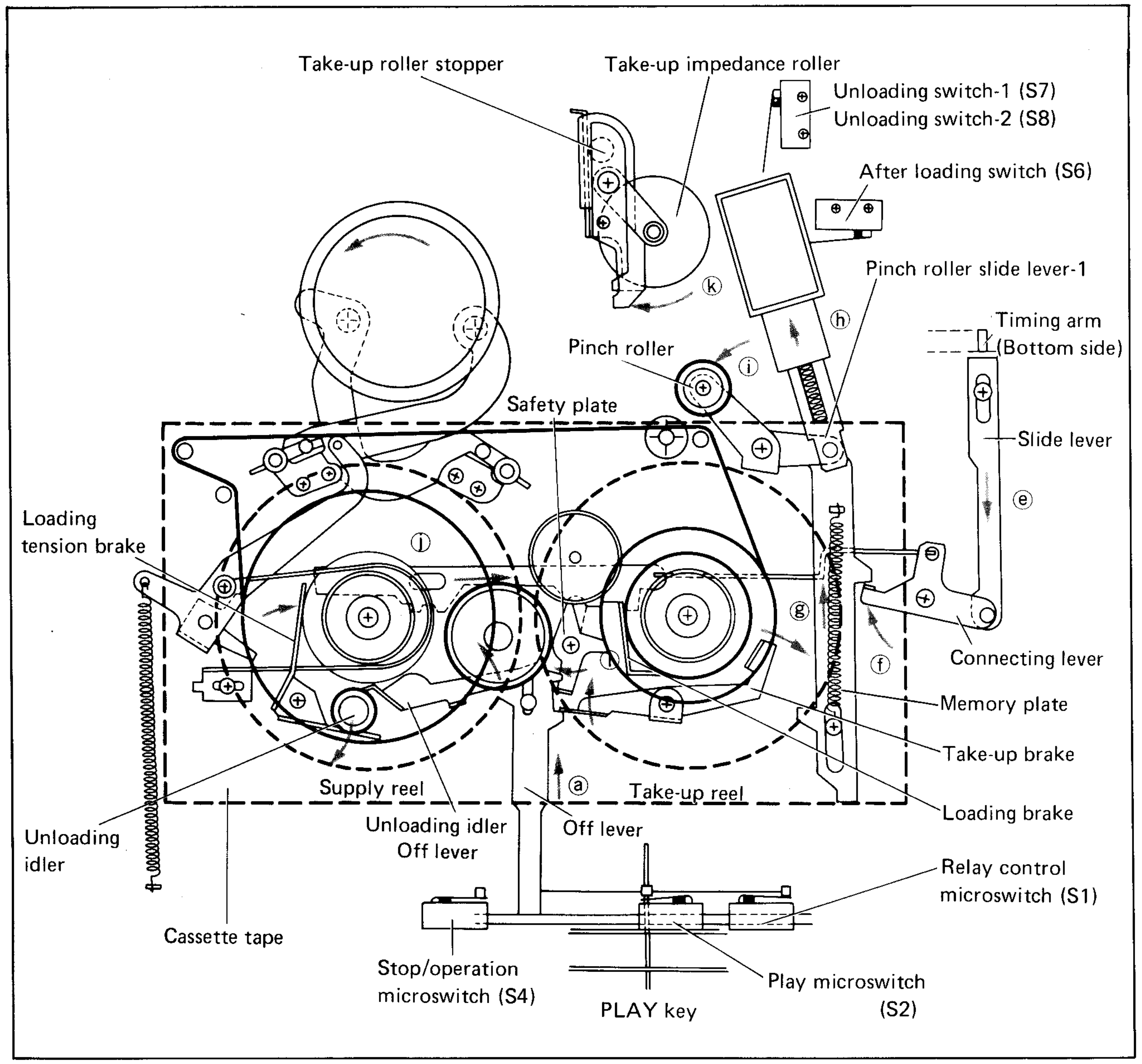

Take-up roller stopper
Take-up impedance roller
Unloading switch-1 (S7)
Unloading switch-2 (S8)
After loading switch (S6)
Pinch roller slide lever-1
ⓚ
ⓗ
Timing arm (Bottom side)
Pinch roller
ⓘ
Safety plate
Slide lever
ⓔ
Loading tension brake
ⓛ
Connecting lever
ⓖ
ⓕ
Memory plate
Take-up brake
Supply reel
ⓐ
Take-up reel
Loading brake
Unloading idler
Unloading idler Off lever
Off lever
Relay control microswitch (S1)
Cassette tape
Stop/operation microswitch (S4)
PLAY key
Play microswitch (S2)

Fig. 2-8 Loading-1 mechanism (Top view)

2.7 LOADING-2 MECHANISM

Refer to Fig. 2-9. Clockwise rotation ⓐ of the timing gear turns roller A. The drive arm moves in direction ⓑ and timing arm spring turns change arms 1 & 2 counter-clockwise. The change arms stop rotating when roller B of change arm-2 contacts the change arm lock lever.

As roller A rotates, counter-clockwise rotation of the drive arm moves the arm drive plate in direction ⓓ and the slide lever also becomes pulled toward the same direction (see Fig. 2-6a). The rotary lever (Fig. 2-9) begins to rotate clockwise ⓔ and the take-up loading arm lever moves in direction ⓕ. At this time, the take-up loading arm rotates clockwise to pull the video tape from the cassette.

Simultaneously, the supply loading lever turns counter-clockwise ⓖ and the supply loading arm also pulls video tape from the cassette. As the rotary lever turns, its connecting rod turns the tension cam counter-clockwise ⓗ. This frees the tension arm, which then begins operation. The drive arm therefore initiates operation of the loading and tension arms.

Configurations of the timing gear components during loading and unloading are shown in Fig. 2-10, while the top view of the loading mechanism-2 components is shown in Fig. 2-11.

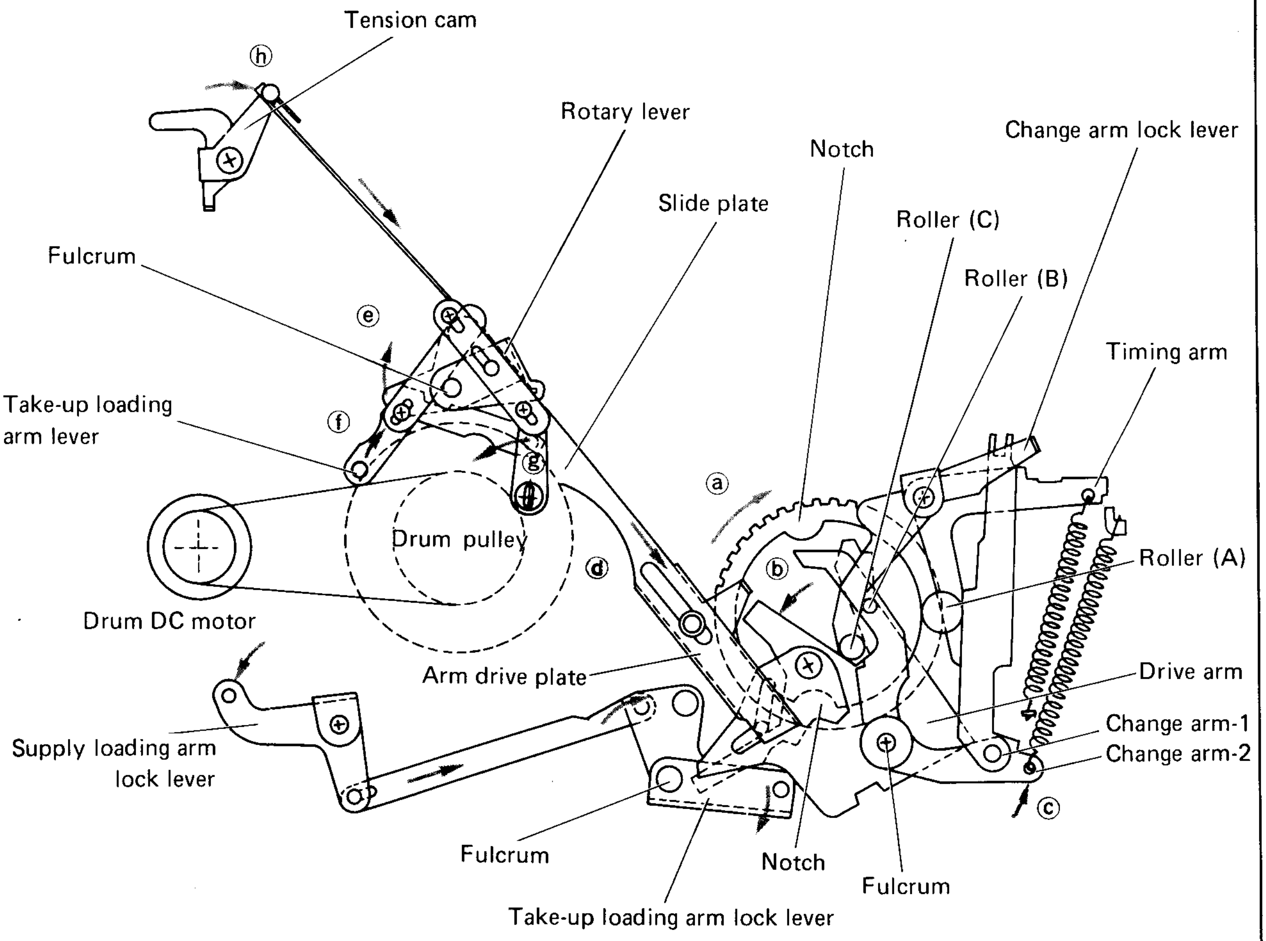

Tension cam
ⓗ
Rotary lever
Notch
Change arm lock lever
Slide plate
Roller (C)
Fulcrum
Roller (B)
ⓔ
Timing arm
Take-up loading arm lever
ⓕ
ⓖ
ⓐ
Drum pulley
Roller (A)
ⓓ
ⓑ
Drum DC motor
Arm drive plate
Drive arm
Supply loading arm lock lever
Change arm-1
Change arm-2
ⓒ
Fulcrum
Notch
Fulcrum
Take-up loading arm lock lever

Fig. 2-9 Loading-2 mechanism (Bottom view)

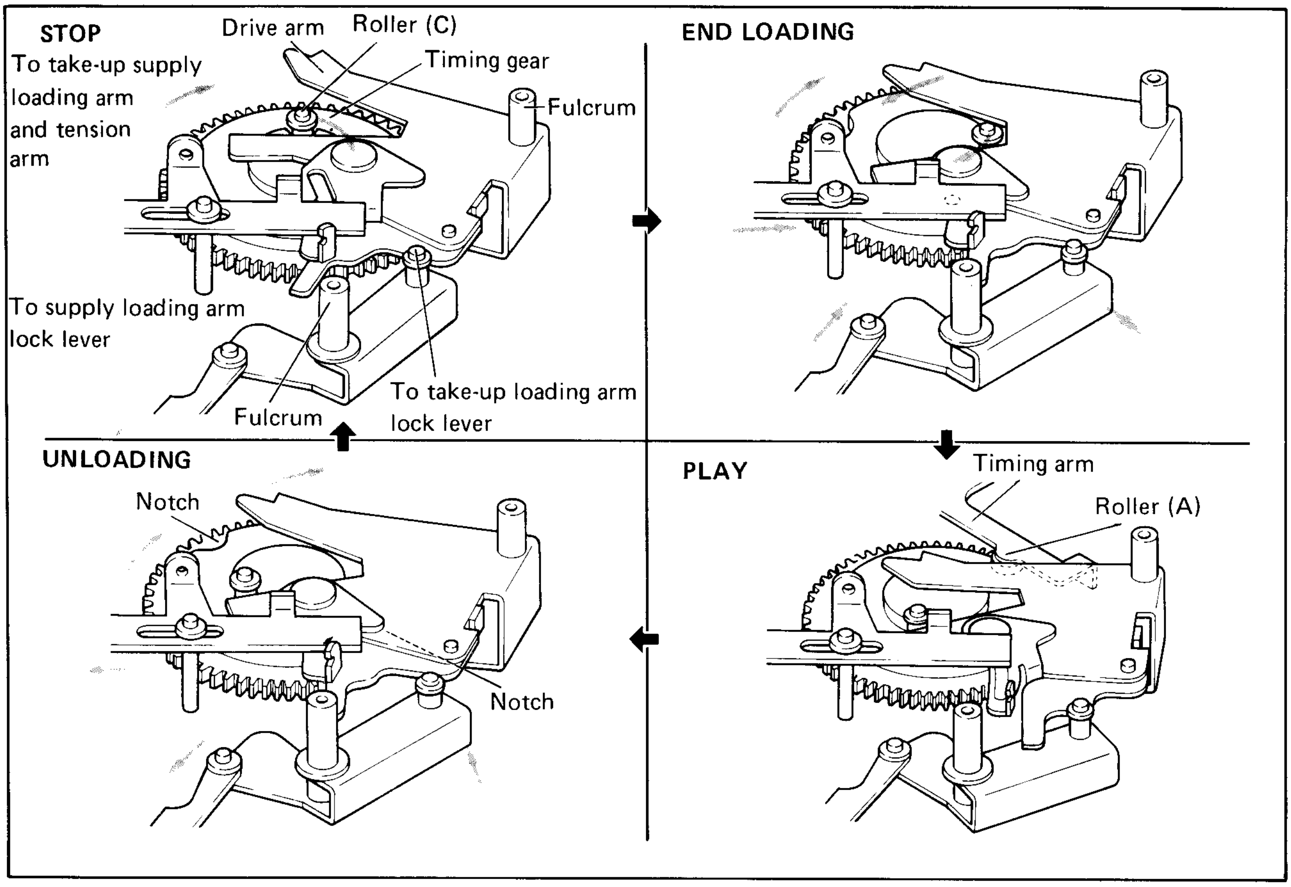

STOP
To take-up supply loading arm and tension arm
Drive arm
Roller (C)
Timing gear
Fulcrum
To supply loading arm lock lever
Fulcrum
To take-up loading arm lock lever
END LOADING
UNLOADING
Notch
Notch
PLAY
Timing arm
Roller (A)

Fig. 2-10

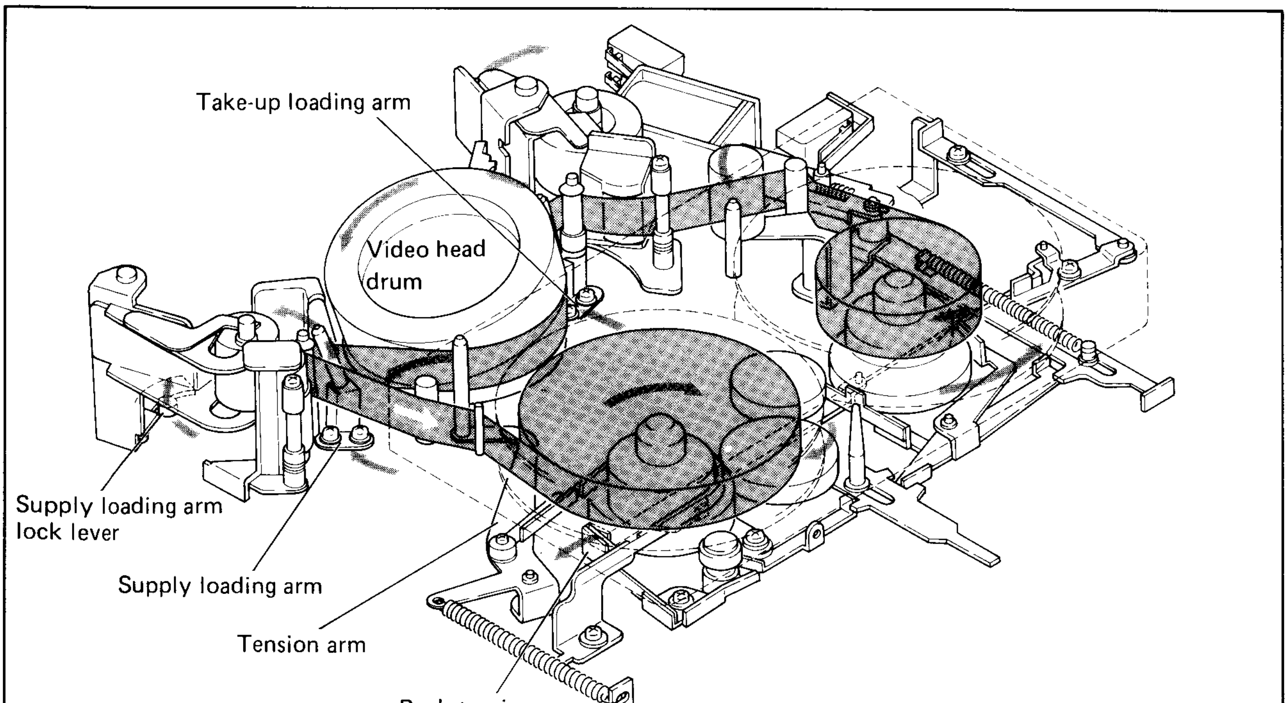

Take-up loading arm
Video head drum
Supply loading arm lock lever
Supply loading arm
Tension arm
Back tension cancel lever

Fig. 2-11 Loading-2 mechanism (Top view)

2.8 PLAY MODE MECHANISM

Refer to Fig. 2-12. Roller C rotation moves the drive arm in direction ⓓ and the arm drive plate in direction ⓔ. When the loading arm reaches the end of loading, drive arm movement ⓓ is applied only to the drive arm plate and the take-up loading arm lock lever. Loading arm movement then stops.

Drive arm movement turns the take-up loading arm lock lever clockwise ⓕ, while the supply loading arm lock lever turns counter-clockwise to lock the supply loading arm. Rotation of the take-up loading arm lock lever operates the pinch slide plate, after which the capstan solenoid engages the pinch roller with the capstan shaft.

As the drive arm approaches the full extent of its rotation, a stud on the bottom of the timing gear trips the kick lever counter-clockwise ⓖ. Play lever-3 then also moves in direction ⓖ. This frees the stud of the change lever from the upper side of play lever-3 groove and enables the change lever to move in direction ⓘ.

Also at the point near maximum rotation of the drive arm, the drive arm lock lever coupled to the change arm lock lever becomes free and moves counter-clockwise ⓗ by spring tension. As the timing gear and roller C rotate, the drive arm becomes locked by roller D of the drive arm lock lever. Roller A of the timing arm then engages with notch E of the timing gear. This frees the change lever, which moves in direction ⓘ due to spring tension. At this point, loading is completed and the machine assumes the Play mode.

See Fig. 2-13. The loading arm begins loading due to drive arm movement. When the loading arm reaches the end of loading, rotation of the drive arm through the take-up loading arm lock lever and the supply loading arm lock lever moves the take-up and supply arm stoppers in directions ⓐ and ⓑ. The loading arm then becomes locked at the arm stopper. With movement of the supply arm stopper, the full erase head and guide pole are shifted to the Play mode position. Tape traveling at this time is determined by the edge of the guide pole.

Together with movement of the take-up loading arm lock lever, pinch roller slide plate-2 (coupled with plate-1) is pulled by a spring in direction ⓒ. The pinch roller is thus drawn closer to the capstan shaft.

The edge of pinch roller slide plate-1 closes the after loading switch (S6), energizing the capstan solenoid. The solenoid plunger moves pinch roller slide plates 1 & 2 further in direction ⓒ. As a result, the pinch roller is pressed against the capstan shaft and tape traveling starts.

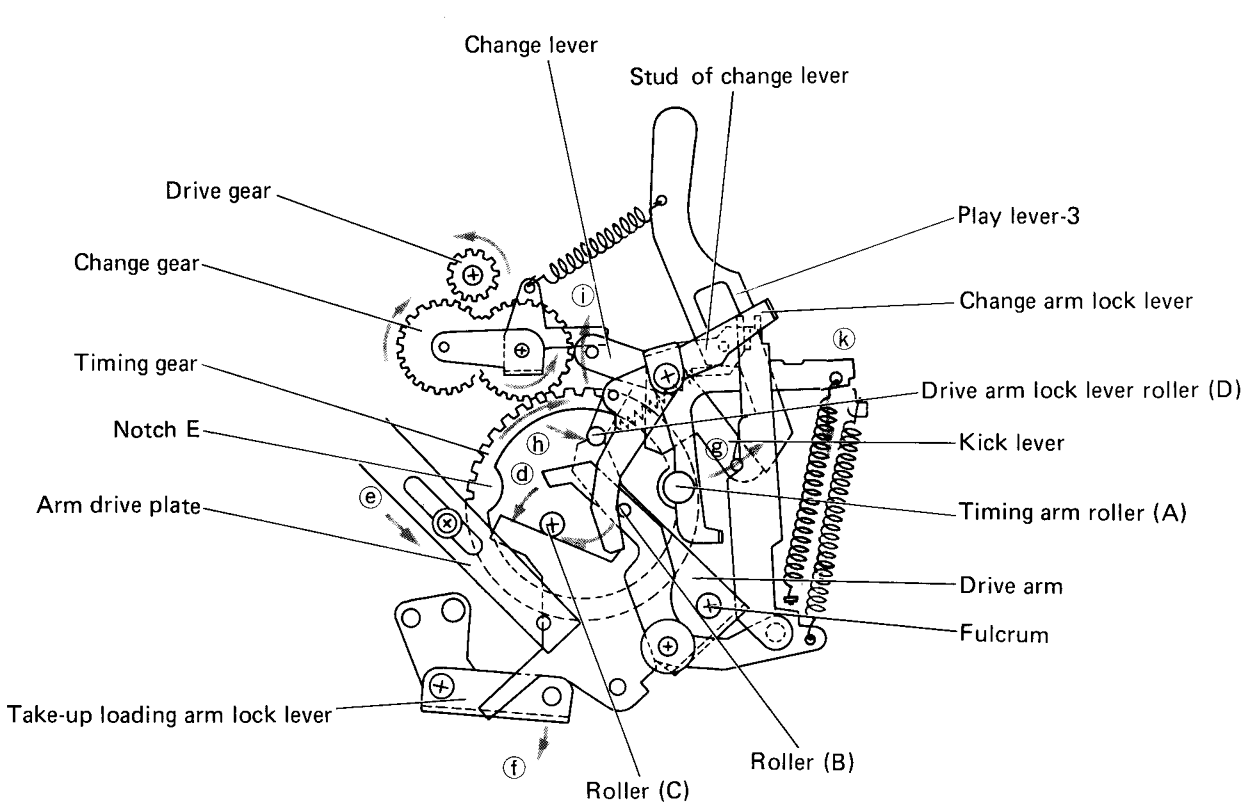


Fig. 2-12 Play mode mechanism (Bottom view)

As pinch roller slide plate-1 pulls the memory plate upwards, the take-up idler lever contacts the memory plate at point A, after which the take-up idler engages with the take-up reel disk. At the same time, the loading brake off lever releases the loading brake from the take-up reel disk.

Following this, the timing gear (Fig. 2-12) continues to rotate and when roller C engages with notch E, the change gear becomes stopped. At the same time, the timing arm (Fig. 2-12) moves in direction ⓚ and the slide plate (Fig. 2-13) in direction ⓕ.

When the slide plate moves toward the left, the supply loading brake is released from the supply reel disk and the back tension cancel lever (Fig. 2-13) turns clockwise ⓖ. Supply back tension becomes applied and Play mode is obtained.

2.9 UNLOADING MECHANISM

Refer to Fig. 2-14. In the Play mode, when the STOP key is pressed, the function mechanism becomes released. Through play levers 1 & 2, the change arm lock lever turns in direction ⓐ. The drive arm lock lever releases the drive arm and the drive arm becomes free. As the change arm lock lever turns clockwise, roller B becomes free and spring tension rotates the change arm counter-clockwise ⓑ.

The opposite side of the change arm moves in direction ⓒ and the change lever turns in direction ⓔ. The change gear then contacts the drive gear. At this time, the timing gear again rotates clockwise and the drive arm turns counter-clockwise ⓕ to its original position. .

When roller A reaches notch E of the timing gear, the

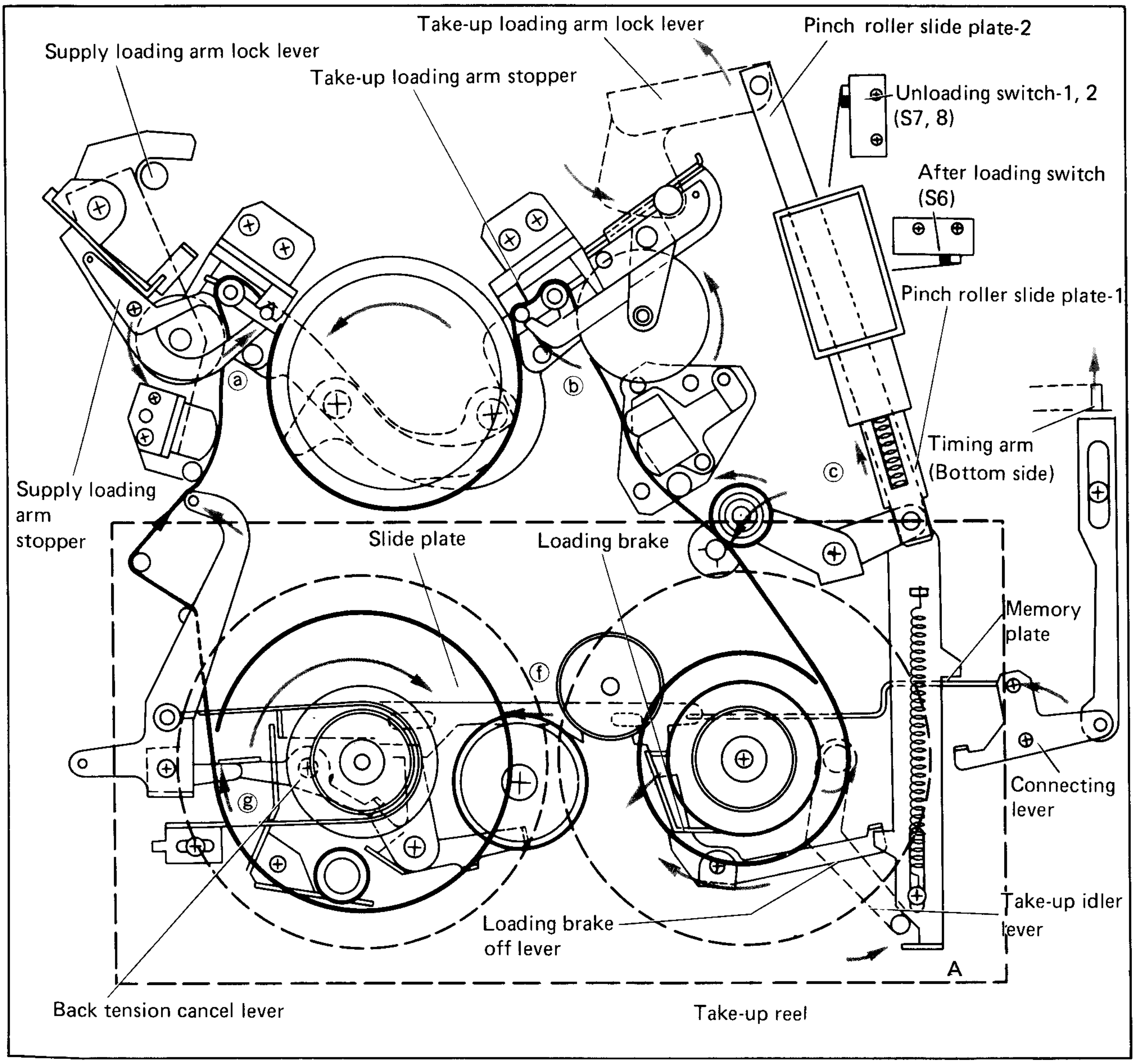

Take-up loading arm lock lever
Pinch roller slide plate-2
Supply loading arm lock lever
Take-up loading arm stopper
Unloading switch-1, 2
(S7, 8)
After loading switch
(S6)
Pinch roller slide plate-1
ⓐ
ⓑ
ⓒ
Timing arm
(Bottom side)
Supply loading
arm
stopper
Slide plate
Loading brake
Memory
plate
ⓕ
ⓖ
Connecting
lever
Take-up idler
lever
Loading brake
off lever
A
Back tension cancel lever
Take-up reel

Fig. 2-13 Play mode mechanism (Top view)

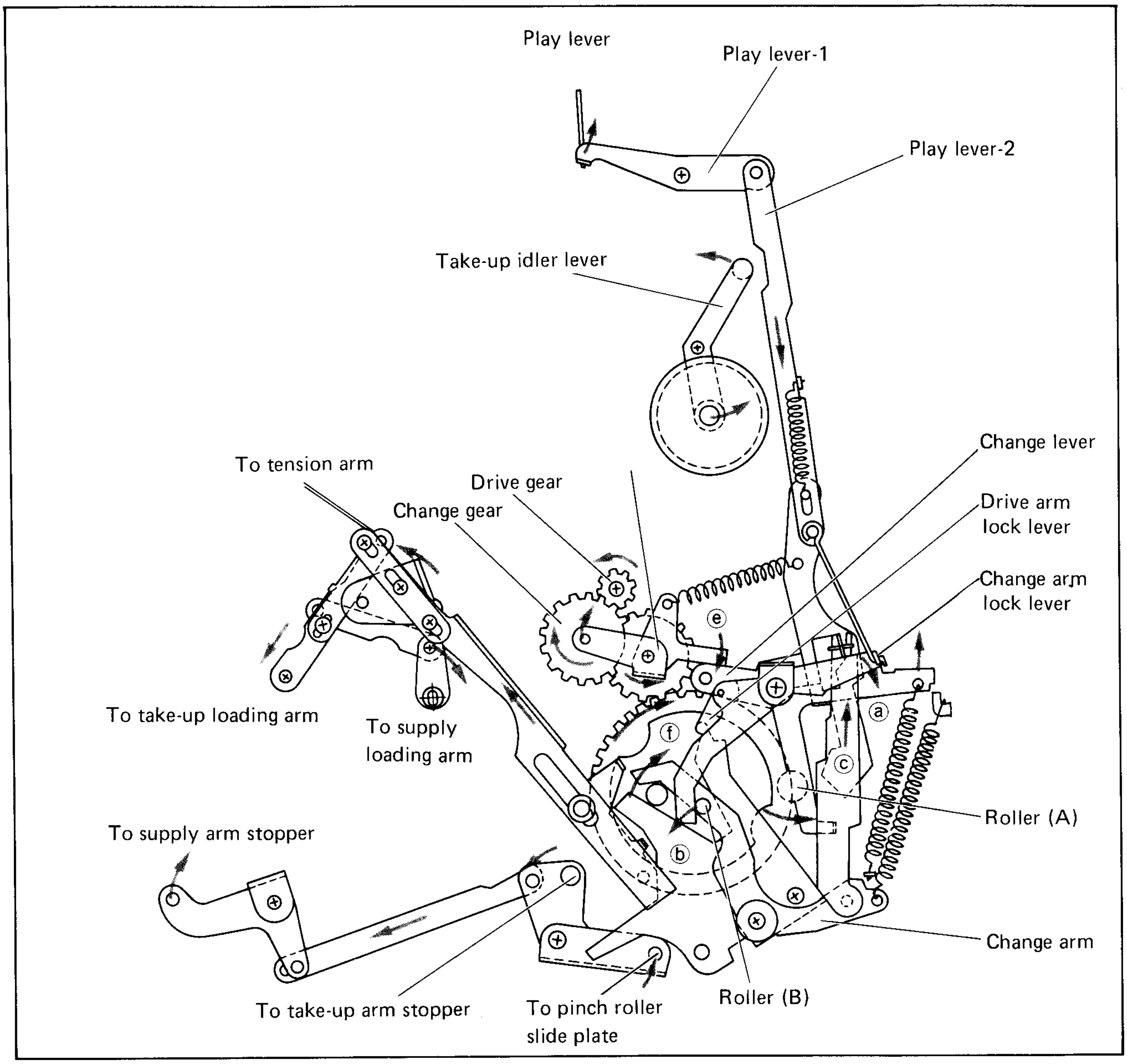

Play lever
Play lever-1
Play lever-2
Take-up idler lever
Change lever
Drive arm lock lever
Change arm lock lever
To tension arm
Drive gear
Change gear
e
a
f
c
b
To take-up loading arm
To supply loading arm
Roller (A)
To supply arm stopper
Change arm
To take-up arm stopper
To pinch roller slide plate
Roller (B)

Fig. 2-14 Unloading mechanism (Bottom view)

change gear becomes released from the drive gear by counter-clockwise rotation of the gear arm. Timing gear rotation then stops.

See Fig. 2-15. After the STOP key is pressed, the unloading idler contacts the supply reel disk and the tape becomes wound onto the supply reel during unloading. Off lever movement also causes the take-up reel brake to contact the take-up reel disk.

The supply roller stopper, supply loading arm, take-up roller stopper and take-up loading arm return to their original stop positions. As timing gear roller A (Fig. 2-14) rotates on the edge of the slide plate, the back tension cancel lever (Fig. 2-15) turns counter-clockwise to release back tension from the supply reel disk. When unloading starts, the after unloading switch (S6) becomes off. At completion of unloading, the unloading switches (S7 & S8) become off when motor rotation stops.

2.10 F. F. MODE MECHANISM

The off lever moves when the F. F. key is pressed and releases the unloading idler from the supply reel disk and the take-up brake from the take-up reel disk. Both take-up and supply reel disks then become free.

At the same time, the F. F. idler moves in direction ⓑ and contacts both the rewind idler and the take-up reel disk. The tape then becomes wound from the supply reel to the take up reel.

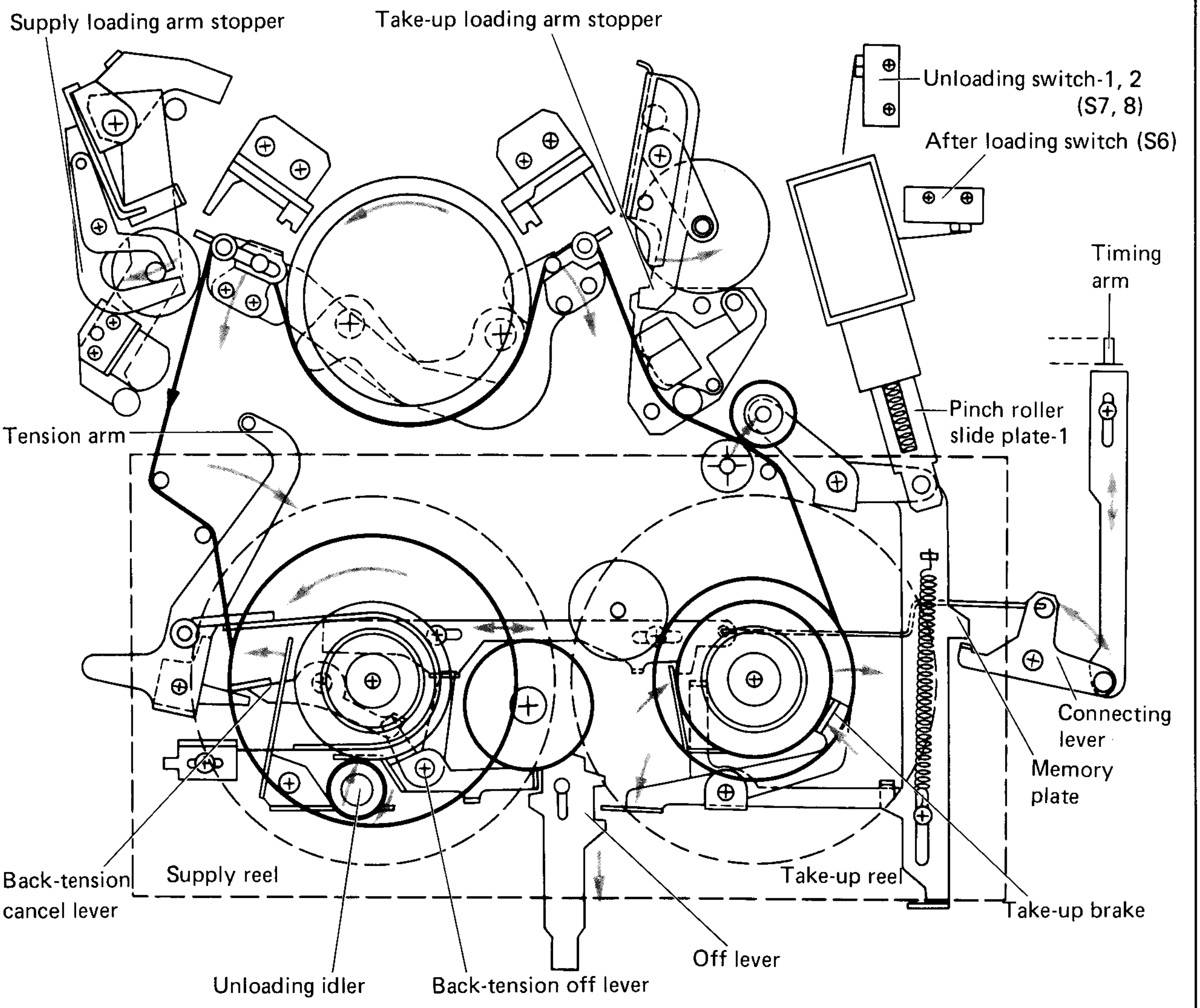

Supply loading arm stopper
Take-up loading arm stopper
Unloading switch-1, 2 (S7, 8)
After loading switch (S6)
Timing arm
Pinch roller slide plate-1
Tension arm
Connecting lever
Memory plate
Back-tension cancel lever
Supply reel
Take-up reel
Take-up brake
Off lever
Unloading idler
Back-tension off lever

Fig. 2-15 Unloading mechanism (Top view)

2.11 REWIND MODE MECHANISM

Pressing the REW key releases the unloading idler from the supply reel disk and the take-up brake from the take-up reel disk. Take-up and supply reel disks then become free.

Pressure from the rewind lever causes the rewind idler to contact the supply reel disk. The tape then becomes rewound from the take-up reel to the supply reel.

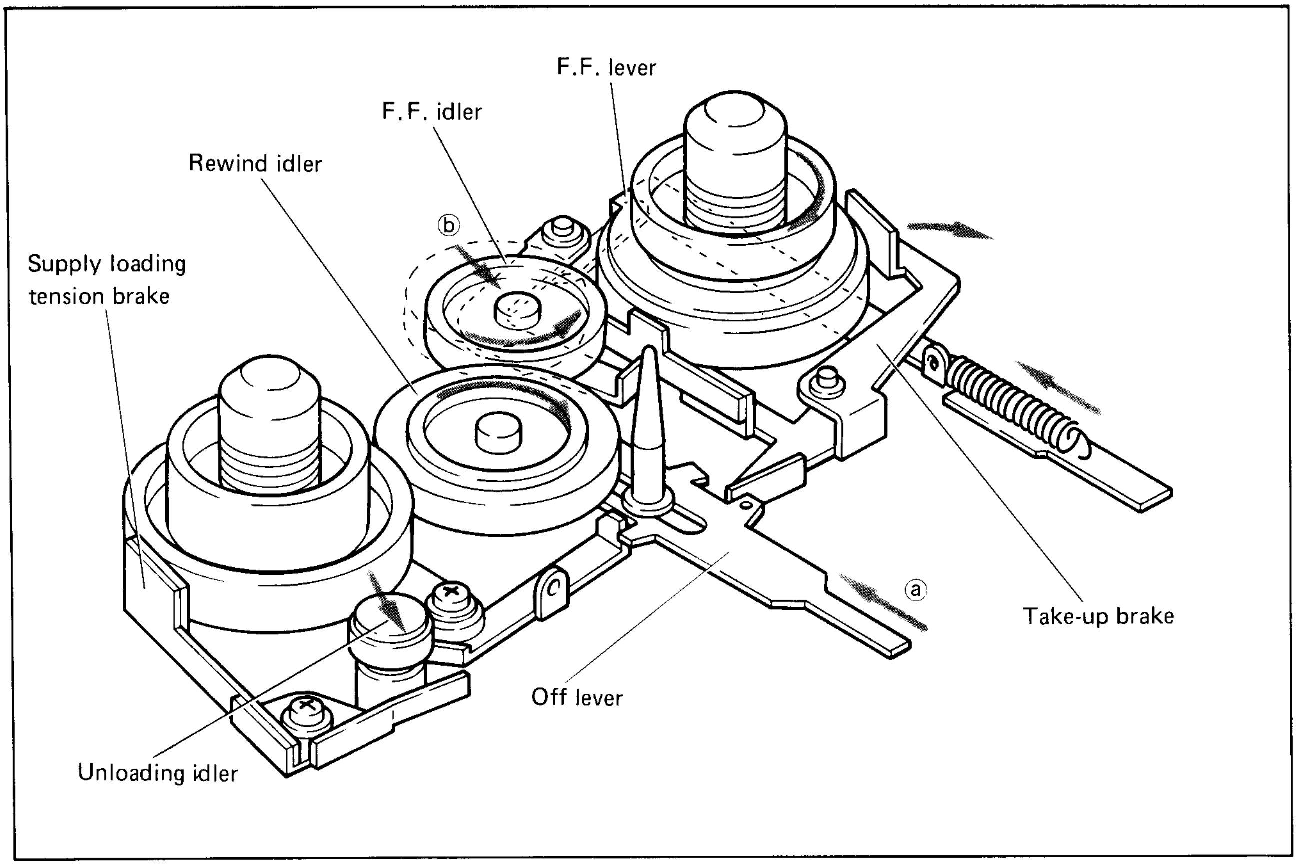

F.F. lever
F.F. idler
Rewind idler
ⓑ
Supply loading tension brake
ⓐ
Take-up brake
Off lever
Unloading idler

Fig. 2-16 F. F. mode mechanism

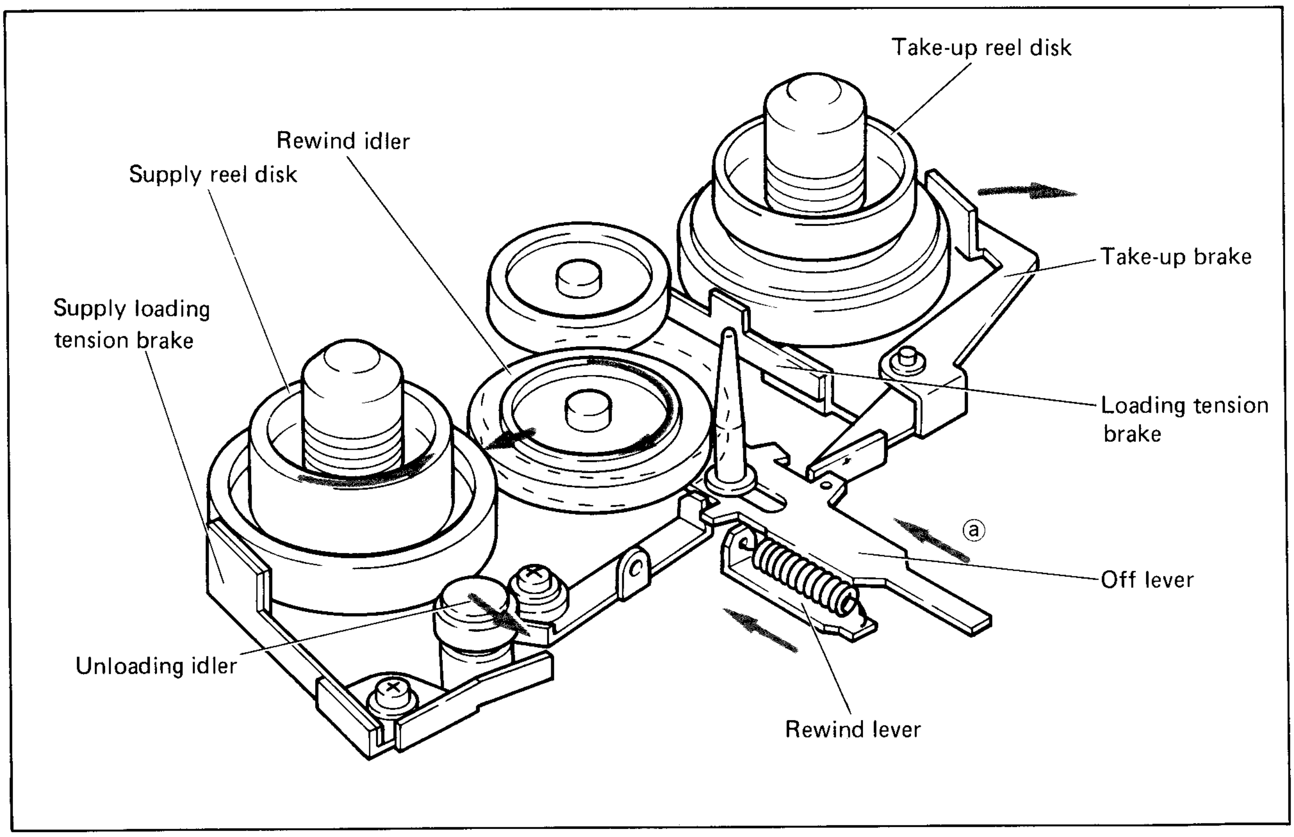

Take-up reel disk
Rewind idler
Supply reel disk
Take-up brake
Supply loading tension brake
Loading tension brake
ⓐ
Off lever
Unloading idler
Rewind lever

Fig. 2-17 REW mode mechanism

2.12 PAUSE MODE MECHANISM

Pressing the PAUSE button in Play or Record mode releases the Pause solenoid.

The memory and pinch roller slide plates return in direction (A) by the spring on the memory plate.

This releases the pinch roller from the capstan shaft. At the same time, the take-up idler ass'y is released from the take-up reel disk by the memory plate. In this condition, tape traveling is stopped.

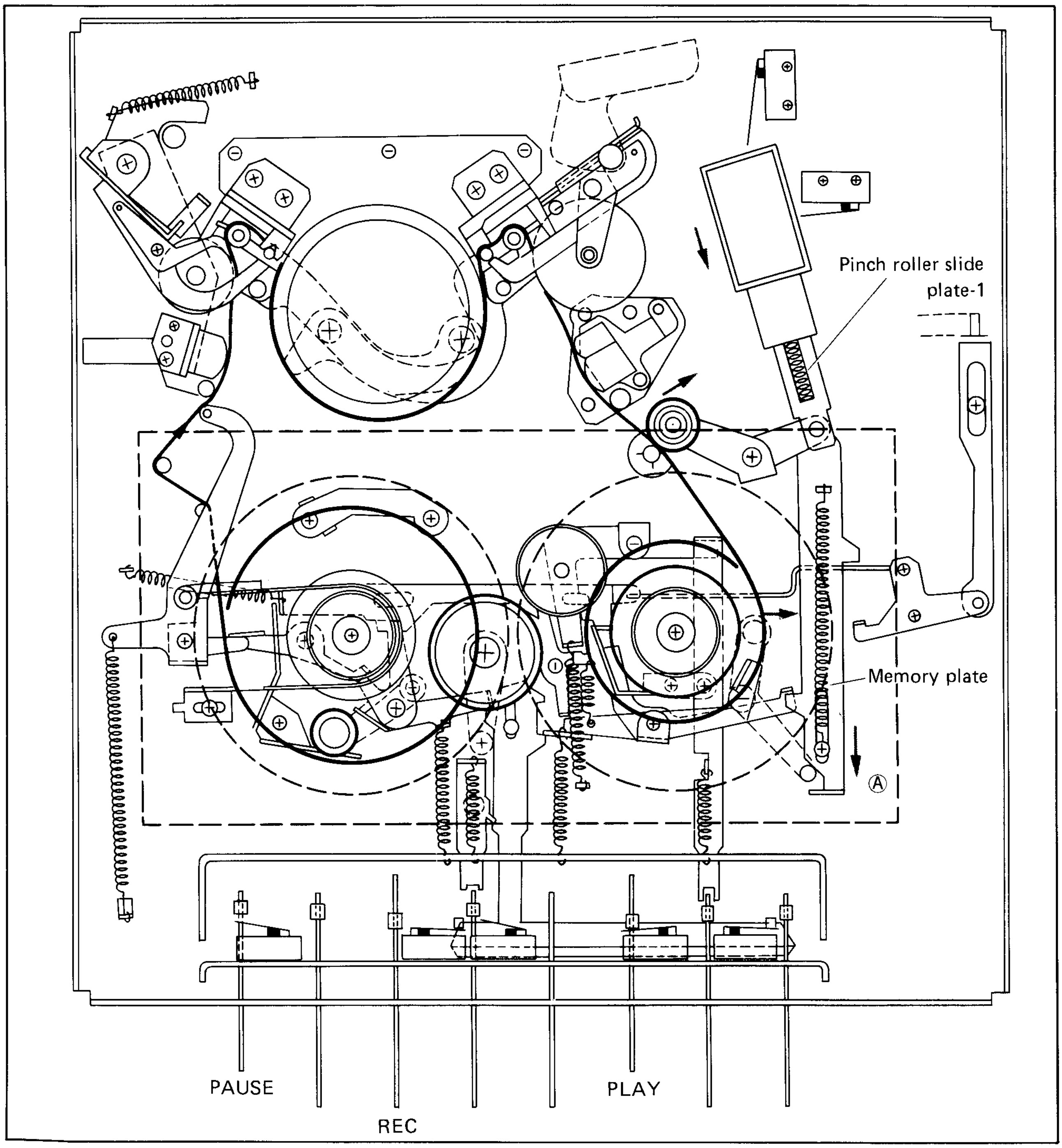

Pinch roller slide plate-1
Memory plate
Ⓐ
PAUSE
PLAY
REC

Fig. 2-18 Pause mode mechanism (Top view)

SECTION 3
CIRCUIT DESCRIPTION

3.1 GENERAL

Although this unit contains a built-in TV tuner and IF (intermediate frequency) circuit assembly, this Section is concerned primarily with the video cassette recorder (VCR) circuits. As the tuner and IF assembly are conventional and similar to those of a typical TV receiver, a detailed description is omitted (however, circuit diagram and reference data are included in the appendix).

Electronically, this unit can be divided into five major sections: audio and servo, preamplifier and record amplifier, mechanism control, luminance (Y) and colour amplifier, and regulator. IC (integrated circuit) devices are widely employed, contributing to both compactness and reliability.

3.2 VIDEO SYSTEM

3.2.1 Outline

Two rotary heads are employed for recording and playback of video signals using the magnetic tape medium. A "colour under" system is used for recording, which compensates for the limitations of magnetic heads and tape for recording the high frequency portions of the colour (PAL) TV signal spectrum. Fig. 3-1 illustrates the high frequency response limitation of the playback head.

The input video signal is converted into an FM signal prior to recording (then demodulated during playback). In order to maintain time base stability, the luminance (Y) and chrominance (chroma) signals are processed separately. Refer to Fig. 3-2.

The luminance signal is frequency modulated between 3.8 MHz and 4.8 MHz, while a bandpass filter (BPF) separates the chroma signal from the luminance signal. The subcarrier is converted from 4.43 MHz to 626.9 kHz, mixed with the FM luminance signal, then recorded as a sideband of 626.9 kHz. The FM signal also functions as AC bias for 626.9 kHz colour signal. Fig. 3-2(A) shows the PAL spectrum, while (B) illustrates the converted spectrum.

During playback, the signals are separated by filter networks and processed individually. The FM luminance signal is demodulated and the chroma subcarrier converted back to 4.43 MHz. Automatic colour correction (ACC) circuits function to minimize hue and chroma amplitude variations, after which the signals are recombined to become a PAL type output signal.

Individual circuits are described in the following pages. Also refer to the overall block diagram and schematic diagrams.

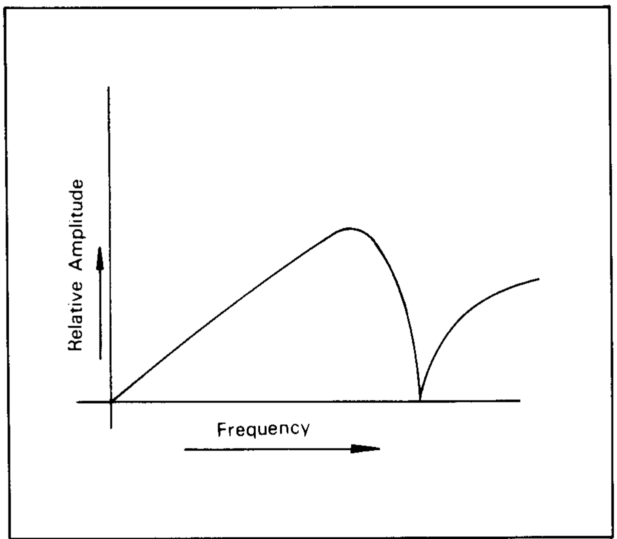
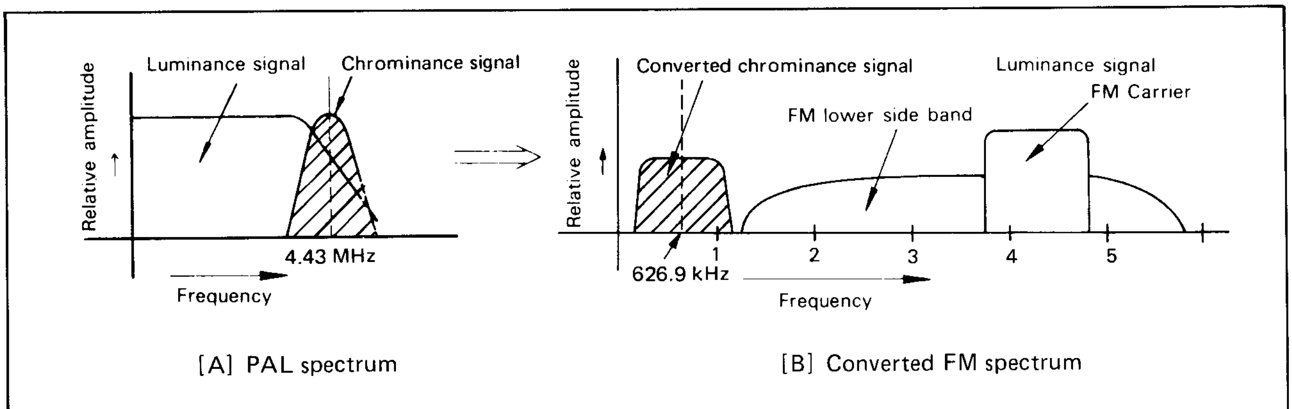


Fig. 3-1 Characteristic response curve for playback head



[A] PAL spectrum

[B] Converted FM spectrum

Fig. 3-2 PAL and converted FM spectra

3.2.2 Signal flow during recording

Refer to Fig. 3-3.

The signal to be recorded is applied to pin 16 (VIDEO IN) of the Y and Colour board. As this signal is obtained from a TV broadcast (off the air) or video camera, the AGC (automatic gain control) circuit contained in IC1 functions to maintain a fixed signal level. Although the AGC circuit is not adjustable externally, optimum parameters have been preset at the factory. From this point, the video signal is branched in two directions.

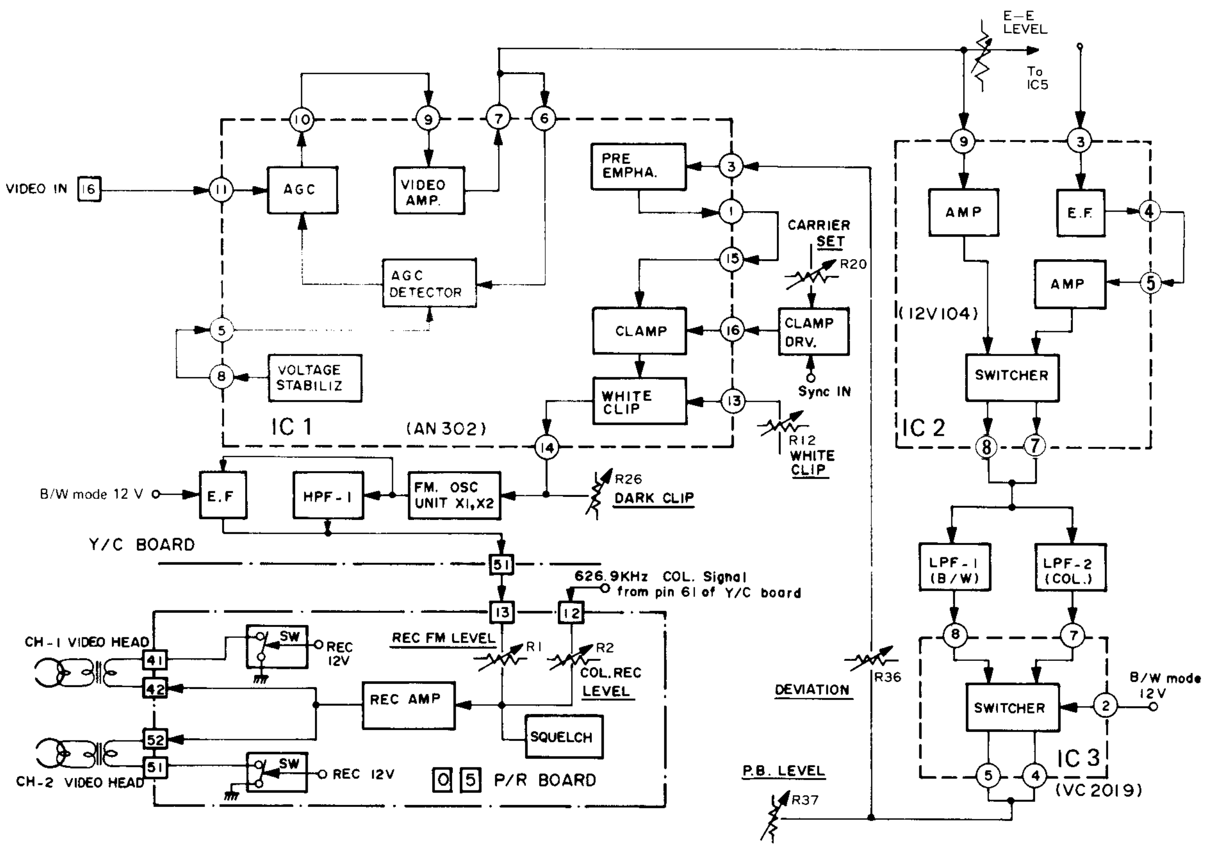
One of these lines goes through IC5 to become the E-E (electric to electric) output at VIDEO OUT.

The other video signal line goes through switching circuits of IC2 and IC3 for selecting record or playback, then returns to IC1 pin 3. In this section of IC1, pre-processing (pre-emphasis, clamping, white clip, etc.) is performed prior to FM conversion.

At the FM modulator, the pre-processed video signal is converted into an FM signal with a deviation of 3.8 MHz – 4.8 MHz. Since the colour signal is converted to low band for "colour under" recording, a highpass filter (HPF-1) removes the unrequired lower FMsideband.

During monochrome (B/W) recording, the FM signal is not applied to HPF-1 in order to obtain higher resolution. The recording amplifier (REC AMP) amplifies this signal to a suitable level for recording onto magnetic tape by the video heads.

For colour recording, a phase shift (PS) method, specially developed for the VHS format, is employed. This method shifts the phase of the colour signal 90° every 1-H (every horizontal TV scanning line). A further description of this process is provided in a following Section.

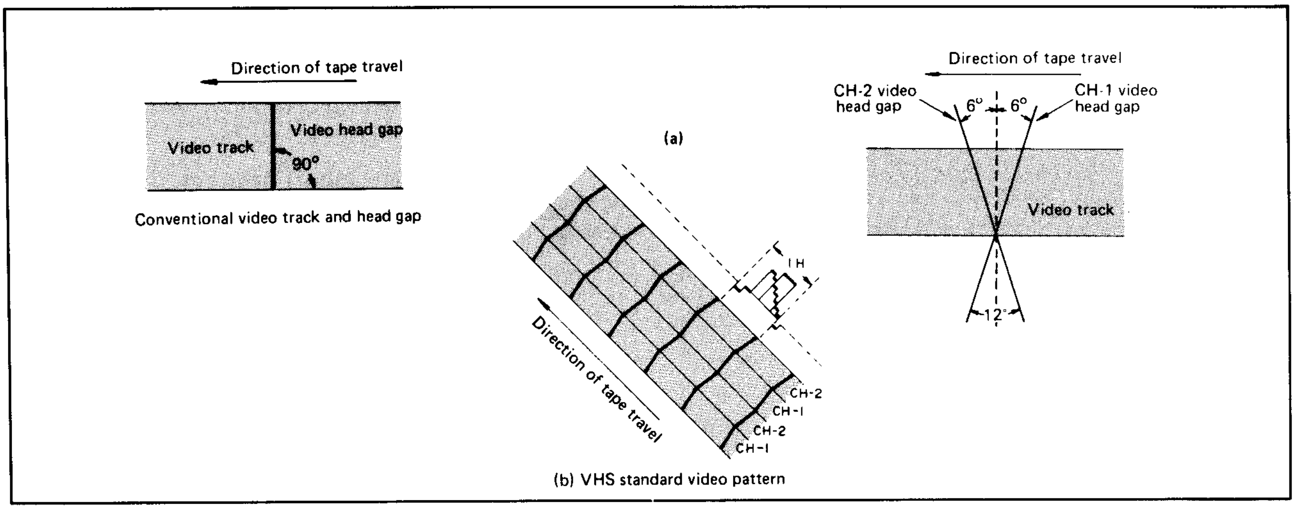

E-E LEVEL
To IC5
VIDEO IN 16
AGC
VIDEO AMP.
AGC DETECTOR
VOLTAGE STABILIZ
IC 1
(AN 302)
PRE EMPHA.
CARRIER SET
R20
CLAMP
CLAMP DRV.
Sync IN
WHITE CLIP
R12 WHITE CLIP
R26 DARK CLIP
B/W mode 12 V
E.F
HPF - I
FM. OSC UNIT X1,X2
Y/C BOARD
626.9KHz COL. Signal from pin 61 of Y/C board
CH-1 VIDEO HEAD
CH-2 VIDEO HEAD
SW
REC 12V
REC FM LEVEL
R1
R2
COL.REC LEVEL
REC AMP
SQUELCH
P/R BOARD
DEVIATION
R36
P.B. LEVEL
R37
AMP
E.F
(12V104)
SWITCHER
IC 2
LPF-1 (B/W)
LPF-2 (COL.)
B/W mode 12V
IC 3
(VC 2019)

KEY TO ABBREVIATIONS:

BPF : Band Pass Filter
DRV. : Drive
E.F. : Emitter Follower
EMPHA: Emphasis
HPF : High Pass Filter
LPF : Low Pass Filter
MOD. : Modulator

Fig. 3-3 Block diagram of luminance signal recording system

3.2.3 Signal flow during playback


Direction of tape travel
Video track
Video head gap
90°
Conventional video track and head gap
(a)
Direction of tape travel
CH-2 video head gap
CH-1 video head gap
6°
6°
Video track
12°
1H
Direction of tape travel
CH-2
CH-1
CH-2
CH-1

(b) VHS standard video pattern

Fig. 3-4 VHS recording tape pattern

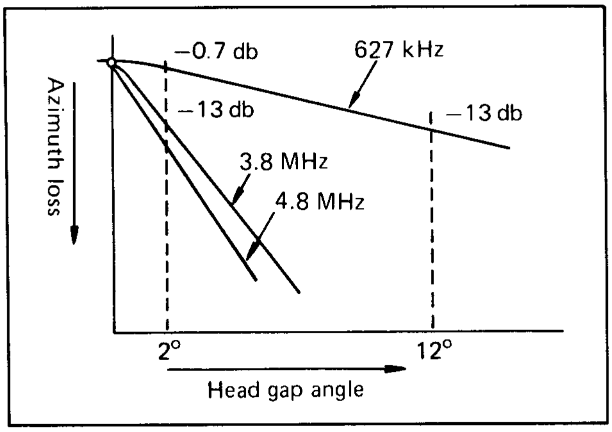
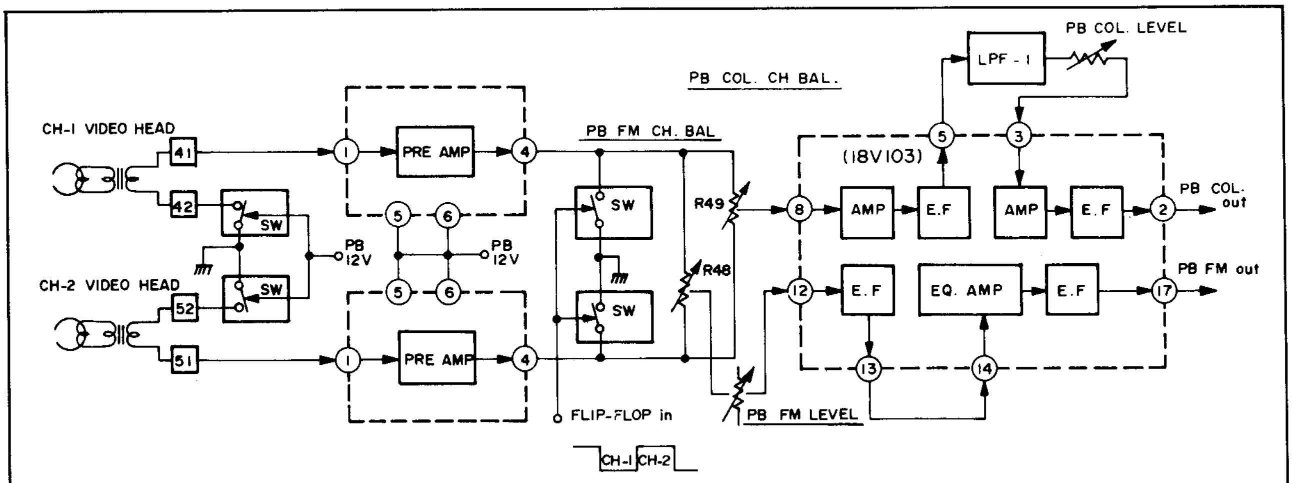


Fig. 3-5 Azimuth loss

Separate preamplifiers are provided for the Ch-1 and CH-2 playback heads, thereby contributing to enhanced signal to noise ratio (S/N) in the playback signal. In addition, the azimuth recording system developed for the VHS format enables high density, high quality playback. Refer to Fig. 3-4 and Fig. 3-5.

The two signals from the playback heads are integrated in accordance with the drum flip-flop signal (squarewave) sent from the servo circuit to become a continuous FM signal. This signal is then sent to the luminance and chroma signal processors. Refer to Fig. 3-8(b).


PB COL. LEVEL
LPF - I
PB COL. CH BAL.
CH-I VIDEO HEAD
41
42
SW
PRE AMP
PB FM CH. BAL
(18V103)
SW
R49
AMP
E.F
AMP
E.F
PB COL. out
PB 12V
PB 12V
CH-2 VIDEO HEAD
52
51
SW
R48
E.F
EQ. AMP
E.F
PB FM out
PRE AMP
SW
FLIP-FLOP in
PB FM LEVEL
CH-I
CH-2
1
4
5
6
5
6
1
4
8
5
3
2
12
17
13
14

KEY TO ABBREVIATIONS:

COL. : Colour
EQ. : Equalizer
LPF : Low Pass Filter
SW : Electronic Switch

Fig. 3-6 Block diagram of luminance and colour signal playback system-1

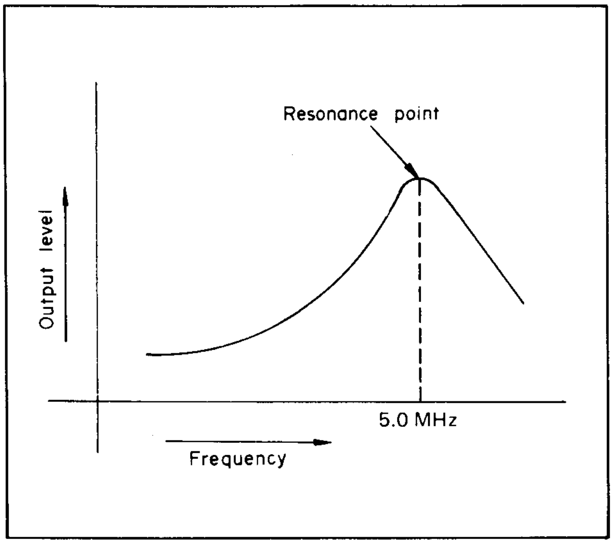


Fig. 3-7 Frequency response of the pre-amplifier

In the luminance signal processor, the playback FM signal goes through an equalizing amplifier which enhances high frequencies in order to obtain optimum resolution and picture quality. See Fig. 3-7. A dropout* compensator is included at this point which contributes to the stability of the playback picture.

**Dropout: Transient loss or reduction in the playback signal due to imperfections in the tape itself. Although this often results from such causes as old tape, inferior quality tape, and improper storage and maintenance of the tape and machine, even the best quality tape contains a certain percentage of dropouts, due to limitations in tape manufacturing technology. The dropout compensator circuit functions to prevent these inherent defects from visibly affecting the picture.*

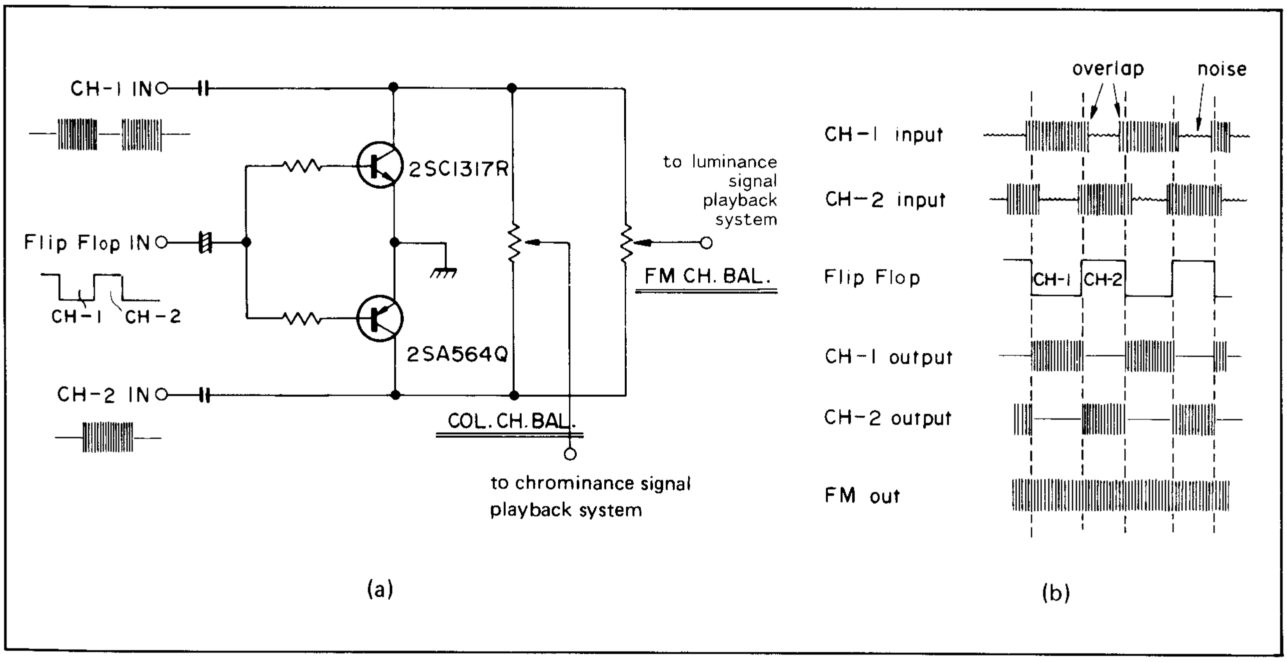

CH-1 IN
Flip Flop IN
CH-1
CH-2
CH-2 IN
2SC1317R
2SA564Q
to luminance signal playback system
FM CH. BAL.
COL. CH. BAL.
to chrominance signal playback system
overlap
noise
CH-1 input
CH-2 input
Flip Flop
CH-1
CH-2
CH-1 output
CH-2 output
FM out
(a)
(b)

Fig. 3-8 FM switching system

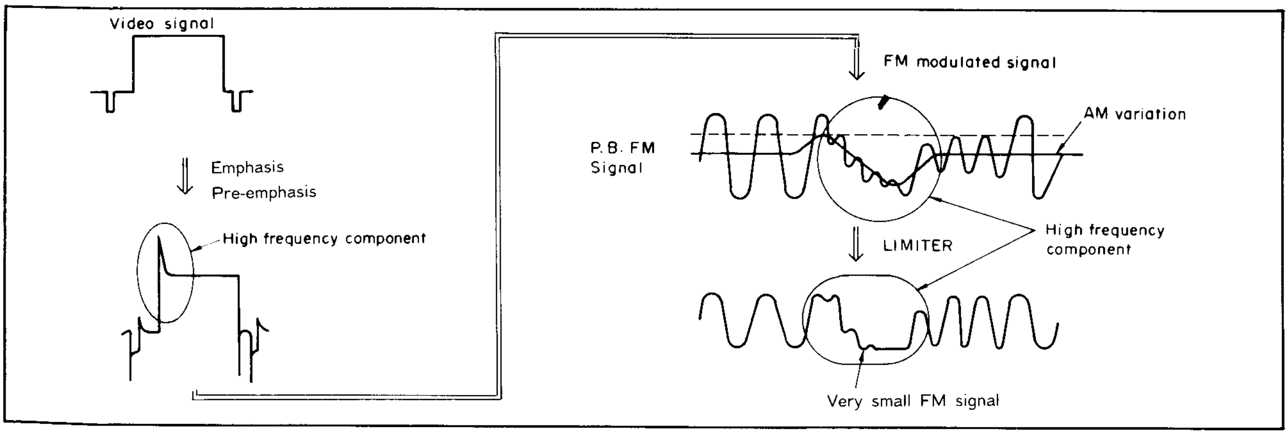

Video signal
Emphasis
Pre-emphasis
High frequency component
FM modulated signal
P. B. FM Signal
AM variation
LIMITER
High frequency component
Very small FM signal

Fig. 3-9 Limiter

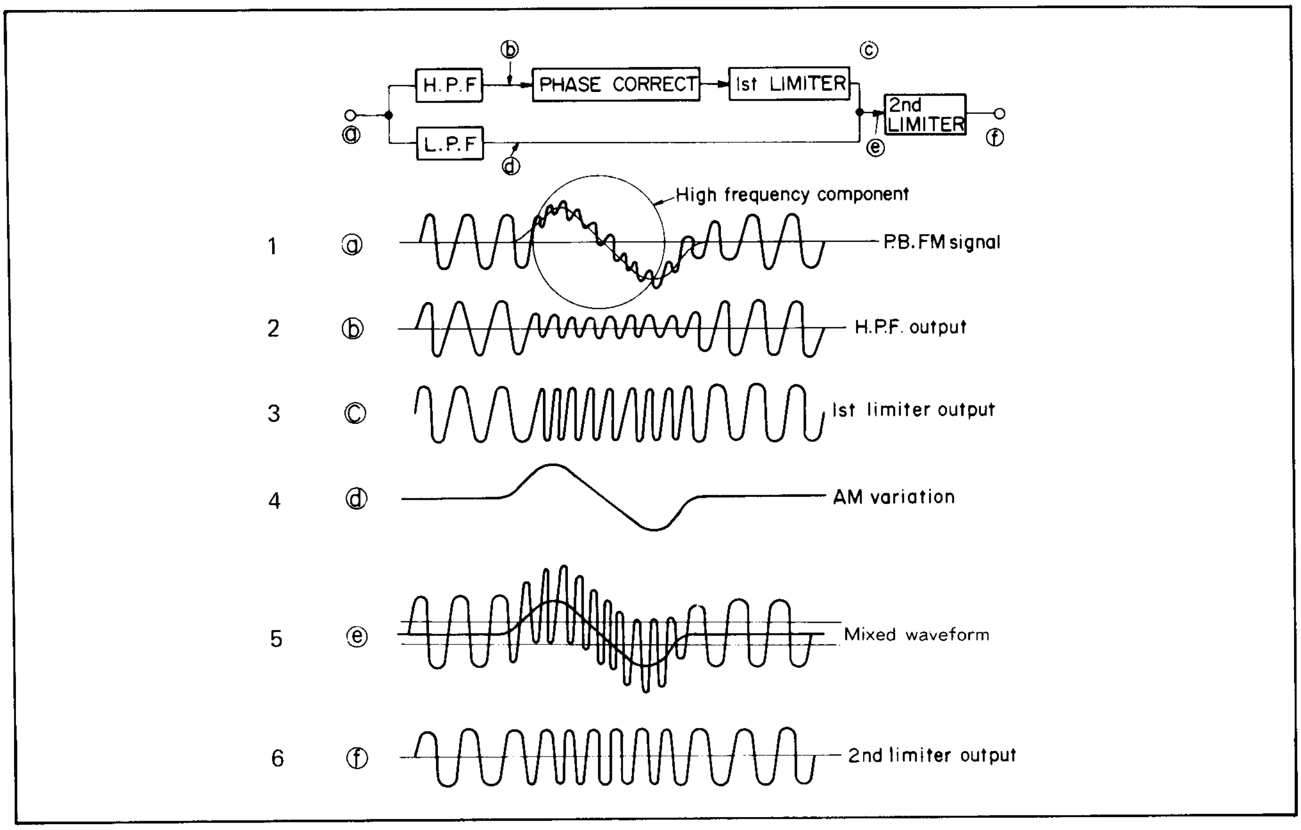

H.P.F
PHASE CORRECT
Ist LIMITER
2nd LIMITER
L.P.F
ⓐ
ⓑ
ⓒ
ⓓ
ⓔ
ⓕ
High frequency component
1
2
3
4
5
6
P.B. FM signal
H.P.F. output
Ist limiter output
AM variation
Mixed waveform
2nd limiter output

Fig. 3-10 Double limiter

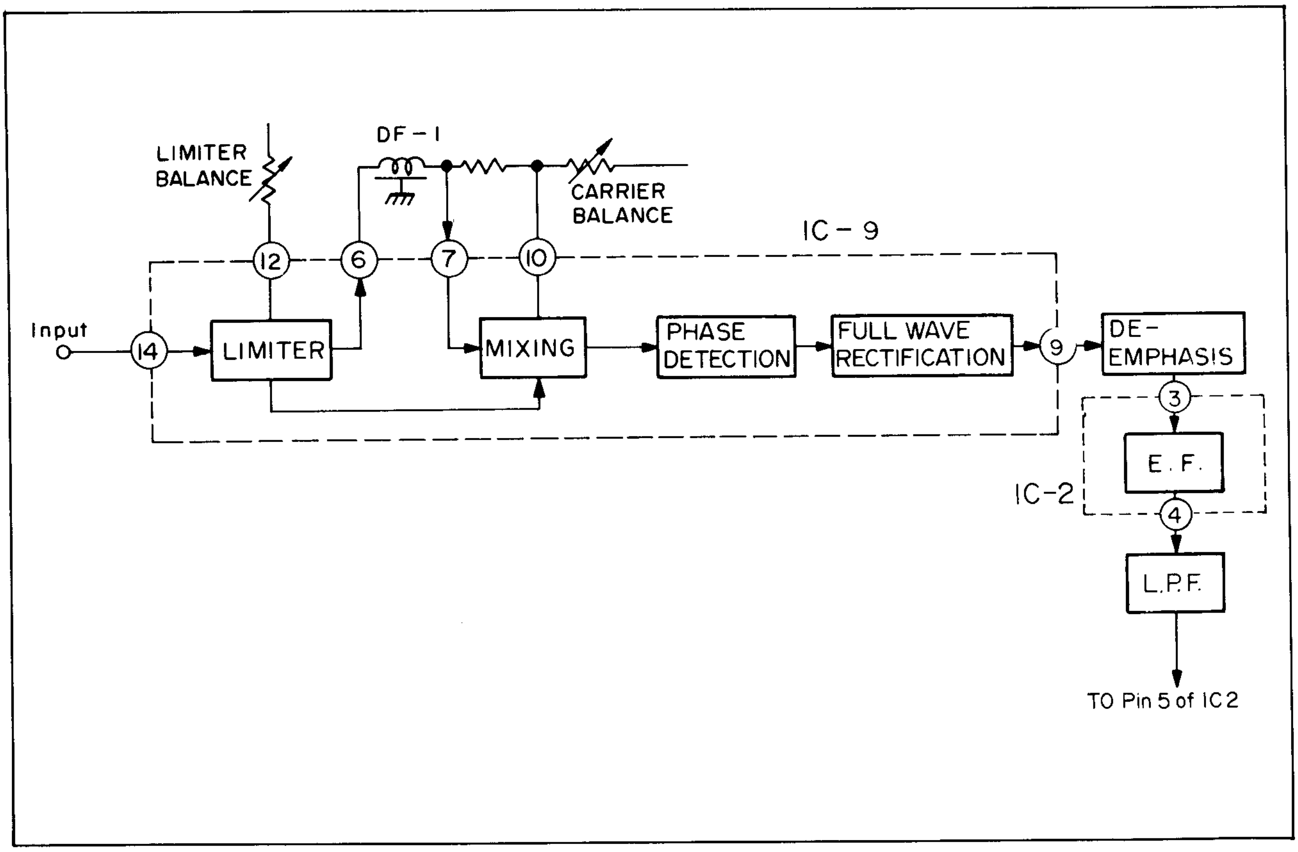

LIMITER BALANCE
DF – I
CARRIER BALANCE
IC – 9
Input
14
12
6
7
10
LIMITER
MIXING
PHASE DETECTION
FULL WAVE RECTIFICATION
9
DE-EMPHASIS
3
E.F.
4
IC-2
L.P.F.
TO Pin 5 of IC 2

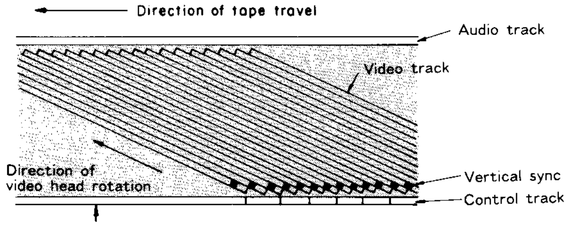
Fig. 3-11 Demodulator block diagram

The obtained FM signal is applied to a double limiter circuit. Refer to Fig. 3-9, 3-10. This circuit is newly adopted in the VHS system and provides wide range, stable limiting and improved S/N which were unattainable in earlier designs. Demodulation is performed utilizing a high performnance delay line type narrow band FM detector to produce the demodulated video signal, as shown in Fig. 3-11.

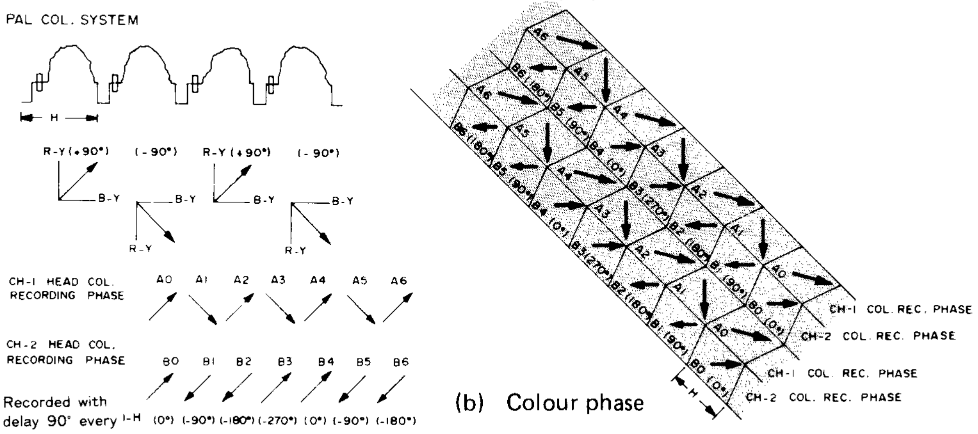
In the next stage, the aperture circuit functions to sharpen contours in the playback picture. The video signal is then mixed with the colour signal from the colour processing circuits and via the output amplifier becomes the output signal sent to the TV monitor.

3.2.4 Colour processing principle

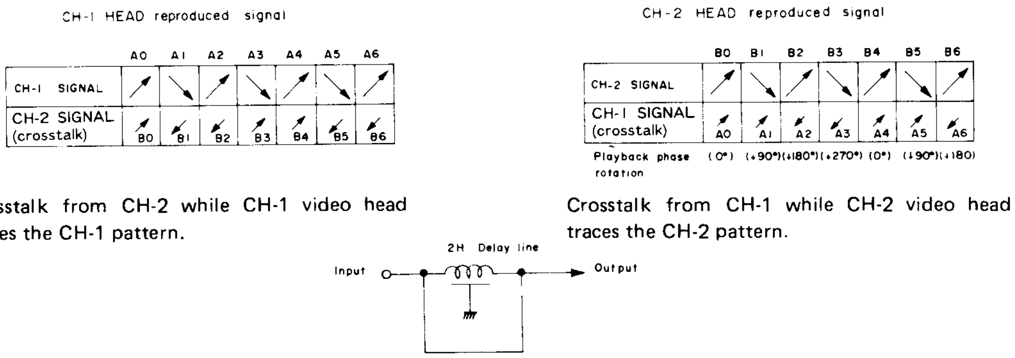
A newly developed phase shift system is employed which makes possible high density recording and high


Direction of tape travel
Audio track
Video track
Direction of video head rotation
Vertical sync
Control track

(a) VHS tape pattern


PAL COL. SYSTEM
H
R-Y(+90°) (-90°) R-Y(+90°) (-90°)
B-Y
R-Y
CH-1 HEAD COL. RECORDING PHASE
A0 A1 A2 A3 A4 A5 A6
CH-2 HEAD COL. RECORDING PHASE
B0 B1 B2 B3 B4 B5 B6
Recorded with delay 90° every 1-H
(0°) (-90°) (-180°) (-270°) (0°) (-90°) (-180°)
CH-1 COL. REC. PHASE
CH-2 COL. REC. PHASE
CH-1 COL. REC. PHASE
CH-2 COL. REC. PHASE
H

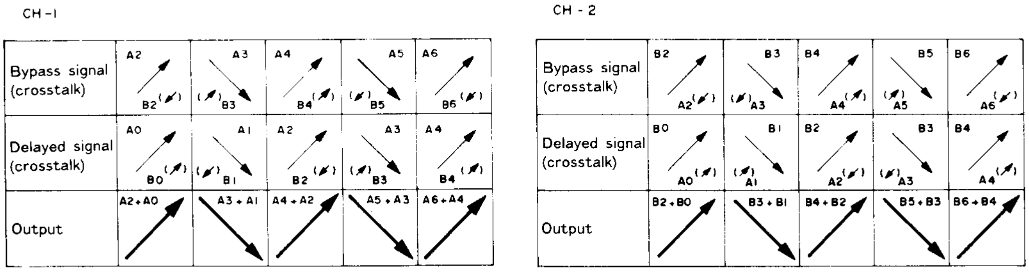
(b) Colour phase


CH-1 HEAD reproduced signal
A0 A1 A2 A3 A4 A5 A6
CH-1 SIGNAL
CH-2 SIGNAL (crosstalk)
B0 B1 B2 B3 B4 B5 B6
CH-2 HEAD reproduced signal
B0 B1 B2 B3 B4 B5 B6
CH-2 SIGNAL
CH-1 SIGNAL (crosstalk)
A0 A1 A2 A3 A4 A5 A6
Playback phase rotation (0°) (+90°)(+180°)(+270°) (0°) (+90°)(+180)
2H Delay line
Input
Output

Crosstalk from CH-2 while CH-1 video head traces the CH-1 pattern.

Crosstalk from CH-1 while CH-2 video head traces the CH-2 pattern.

(c) Reproduced colour signal


CH-1
Bypass signal (crosstalk)
A2 A3 A4 A5 A6
B2 B3 B4 B5 B6
Delayed signal (crosstalk)
A0 A1 A2 A3 A4
B0 B1 B2 B3 B4
Output
A2+A0 A3+A1 A4+A2 A5+A3 A6+A4
CH-2
Bypass signal (crosstalk)
B2 B3 B4 B5 B6
A2 A3 A4 A5 A6
Delayed signal (crosstalk)
B0 B1 B2 B3 B4
A0 A1 A2 A3 A4
Output
B2+B0 B3+B1 B4+B2 B5+B3 B6+B4

(d) P/B colour signal

Fig. 3-12 VHS Colour Standard

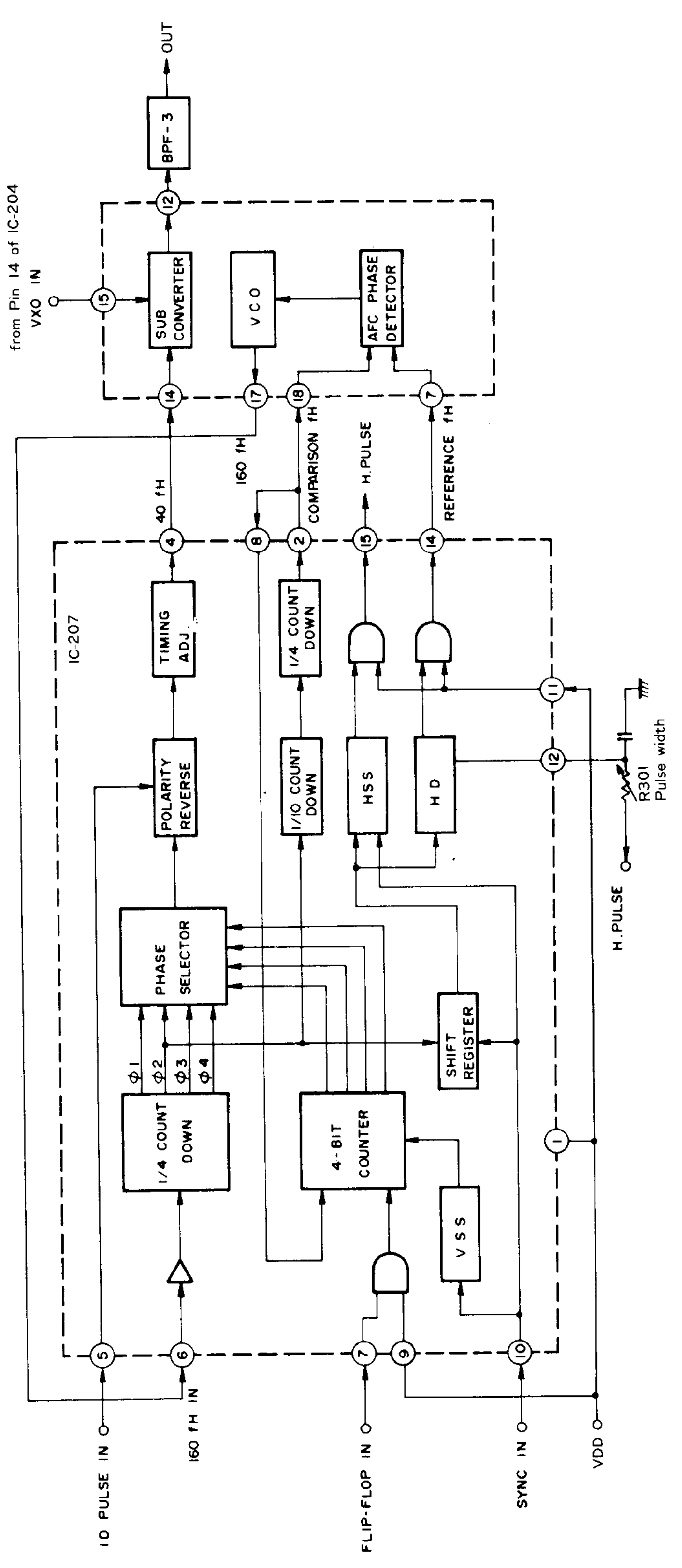

I D PULSE IN
160 fH IN
FLIP-FLOP IN
SYNC IN
VDD
IC-207
1/4 COUNT DOWN
φ1
φ2
φ3
φ4
PHASE SELECTOR
POLARITY REVERSE
TIMING ADJ.
4-BIT COUNTER
VSS
SHIFT REGISTER
1/10 COUNT DOWN
1/4 COUNT DOWN
HSS
HD
H.PULSE
R301
Pulse width
40 fH
160 fH
COMPARISON fH
H.PULSE
REFERENCE fH
from Pin 14 of IC-204
VXO IN
SUB CONVERTER
VCO
AFC PHASE DETECTOR
BPF-3
OUT
1
2
4
5
6
7
8
9
10
11
12
14
15
17
18

Fig. 3-13 Block diagram of AFC system

quality colour images. This system shifts the colour subcarrier phase by 90° every 1-H and effectively prevents interference from signals recorded on an adjacent track. See Fig. 3-13.

Horizontal sync from the audio and servo board is applied as reference to pin 43 of the Y and Colour board. From this signal, a voltage controlled oscillator (VCO) which utilizes a phase locked loop (PLL) circuit, oscillates at 2.5 MHz. The oscillator output goes to a logic circuit from which 626.9 kHz with phase shifted 90° every 1-H is obtained (IC207 pin 6).

This signal is sent to a balanced modulator where it is mixed with the output of a 4.43 MHz crystal oscillator (X'TAL 202), resulting in 5.12 MHz with phase shifted 90° every 1-H. The 5.12 MHz and 4.43 MHz of the input colour signal are mixed at IC202 balanced modulator to become 5.12 MHz ± 4.43 MHz or 626 kHz and 9.5 MHz, as shown in Fig. 3-14.

The required phase shifted 626 kHz is then obtained through a lowpass filter (LPF-201), mixed with the FM luminance signal and recorded on tape.

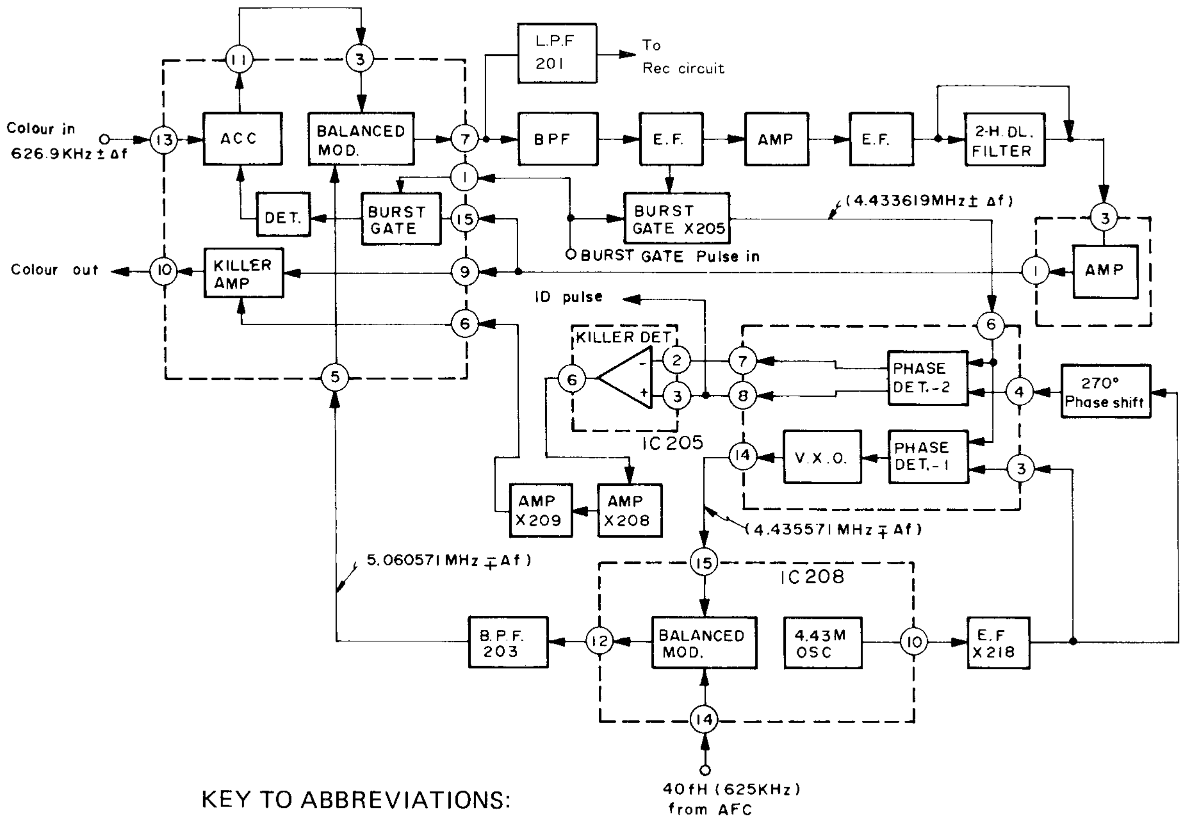
During playback, the video heads pickup the colour signal, after which a continuous signal is obtained from the preamplifiers. Before it is sent to the colour circuits, the signal goes through the same route as the FM luminance signal.

The playback colour processor consists largely of APC (automatic phase control) and AFC (automatic frequency control) loops.

The APC loop takes a portion of the colour processor output and compares its phase with the output of a 4.43 MHz crystal oscillator. Correction is performed according to the resulting error signal.

Two main functions are performed by the AFC loop. The first is to return the phase shifted colour signal to its original form and the second is to correct the time axis in order to compensate for tape elasticity and slight differences between recording and playback speeds. Input of this loop is the (playback) horizontal sync signal from the luminance signal circuit.

In the AFC circuit, 1-H phase shifted 626.9 kHz is applied to pin 14 of IC208, while 4.43 MHz from the


Colour in 626.9KHz ± Δf
Colour out
ACC
BALANCED MOD.
DET.
BURST GATE
KILLER AMP
L.P.F 201
To Rec circuit
BPF
E.F.
AMP
E.F.
2-H DL. FILTER
BURST GATE X205
BURST GATE Pulse in
(4.433619MHz± Δf)
ID pulse
KILLER DET
IC 205
PHASE DET.-2
PHASE DET.-1
V.X.O.
270° Phase shift
AMP
AMP X209
AMP X208
(4.435571 MHz ∓ Δf)
5.060571 MHz ∓Δf)
IC208
B.P.F. 203
BALANCED MOD.
4.43M OSC
E.F X218
40fH (625KHz) from AFC
11
3
13
7
1
15
9
10
6
5
2
3
7
8
6
14
4
3
1
3
15
12
10
14

KEY TO ABBREVIATIONS:

BPF : Band Pass Filter
CONV. : Converter
D.L. FILTER: Delay Line Filter
E.F. : Emitter Follower
V.X.O. : Variable X'tal Oscillator

Fig. 3-14 Block diagram of automatic phase control (APC) system

APC loop VXO (voltage controlled crystal oscillator) is applied to pin 15. The two signals are mixed to yield a sum frequency.

This frequency is phase shifted in precisely the opposite direction as during recording to obtain 5.12 MHz.

In a manner exactly opposite of that during recording, the 5.12 MHz is converted to produce the 4.43 MHz colour signal.

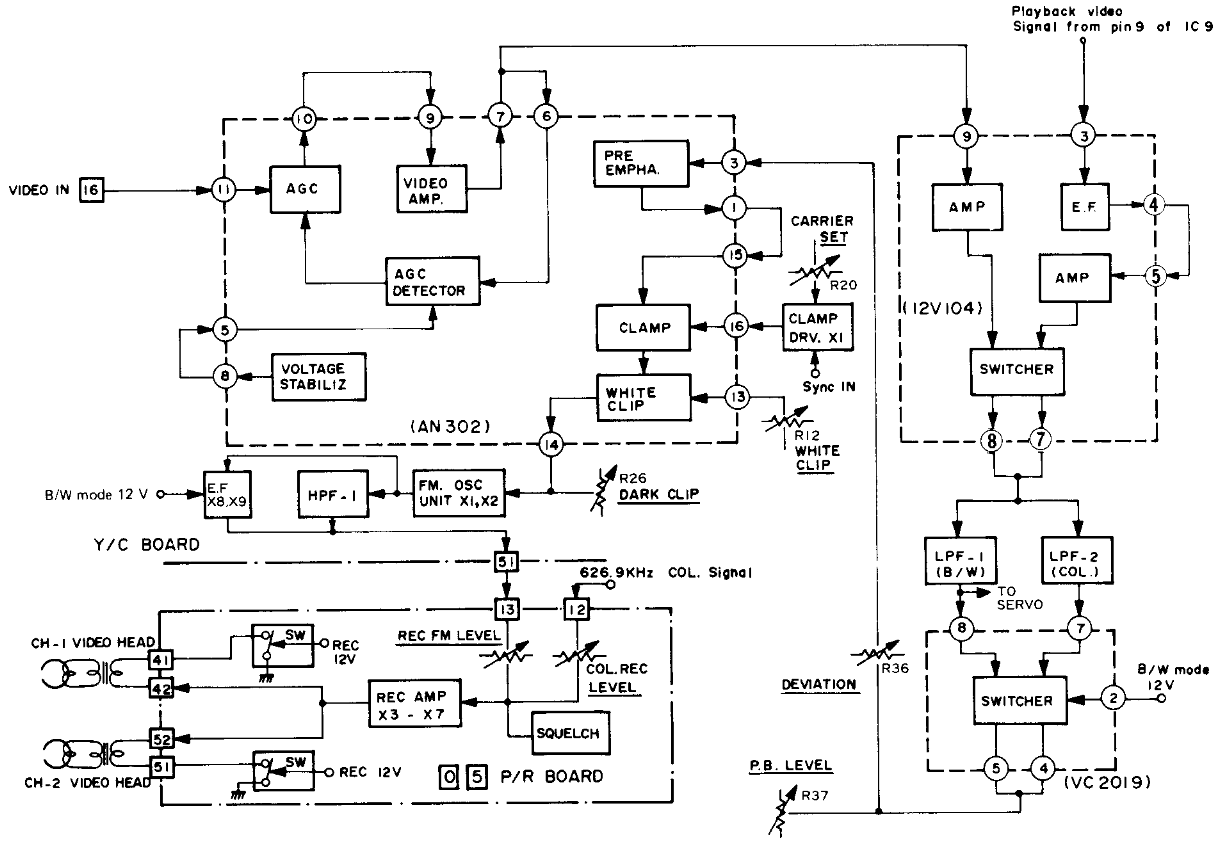
In the PAL colour system, R-Y and B-Y signals are alternately transmitted every 1-H and the signals up to 2-H possess mutual similarity. This property can be utilized by passing the playback PAL colour signal through a 2-H delay line, thereby cancelling adjacent channel cross-talk.

3.2.5 Circuit description

Luminance (Y) signal circuit

[RECORDING]
IC1 contains AGC (automatic gain control), pre-emphasis, white clip and clamp circuits. The AGC circuit functions to limit the input video signal to a certain level in order to allow compatibility with different types of inputs (off the air TV, video camera, etc.).

Following the AGC circuit, the input signal is distributed to the E-E (electric to electric) and REC (recording) outputs. A switching circuit selects between recording and playback modes, after which low pass filters (LPF) determine monochrome (B/W) or colour.



Playback video Signal from pin 9 of IC 9
VIDEO IN 16
11
AGC
10
9
7
6
VIDEO AMP.
AGC DETECTOR
PRE EMPHA.
3
1
15
16
13
14
CARRIER SET
R20
CLAMP
CLAMP DRV. X1
Sync IN
WHITE CLIP
R12 WHITE CLIP
5
8
VOLTAGE STABILIZ
(AN 302)
B/W mode 12 V
E.F X8.X9
HPF - I
FM. OSC UNIT X1,X2
R26 DARK CLIP
Y/C BOARD
51
626.9KHz COL. Signal
13
12
CH - I VIDEO HEAD
41
42
52
51
CH-2 VIDEO HEAD
SW
REC 12V
REC FM LEVEL
COL.REC LEVEL
REC AMP X3 - X7
SQUELCH
SW
REC 12V
0 5 P/R BOARD
DEVIATION
R36
P.B. LEVEL
R37
9
3
AMP
E.F.
4
AMP
5
(12V104)
SWITCHER
8
7
LPF - I (B/W)
LPF-2 (COL.)
TO SERVO
8
7
SWITCHER
2
B/W mode 12V
5
4
(VC 2019)

KEY TO ABBREVIATIONS:

BPF	: Band Pass Filter	EMPHA:	Emphasis	LPF	: Low Pass Filter
DRV.	: Drive	HPF	: High Pass Filter	MOD.	: Modulator
E.F.	: Emitter Follower				

Fig. 3-15 Block diagram of luminance signal recording system

The signal through the B/W mode filter goes to X7, where its impedance is converted, then as video signal to the servo circuit.

Another output of the switching circuit goes to the pre-emphasis circuit. Although a large pre-emphasis is applied in order to enhance signal to noise (S/N) ratio, the VHS system does not require extreme pre-emphasis or expansion of the high frequency components. White and dark clipping circuits are included for maintaining appropriate pre-emphasis and removing waveform overshoot, as shown Fig. 3-17.

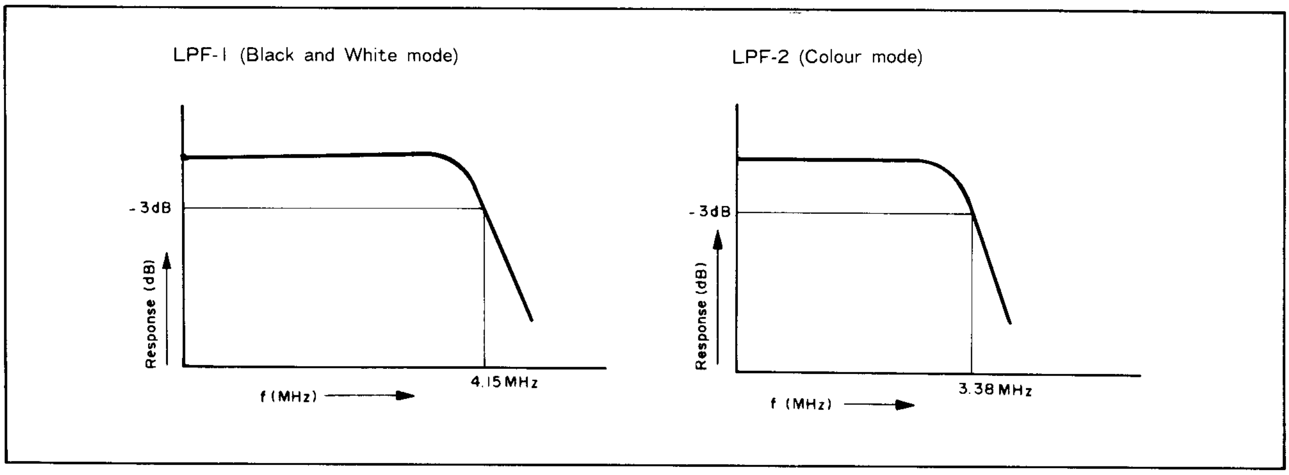


Fig. 3-16 LPF-1 and LPF-2 response curves

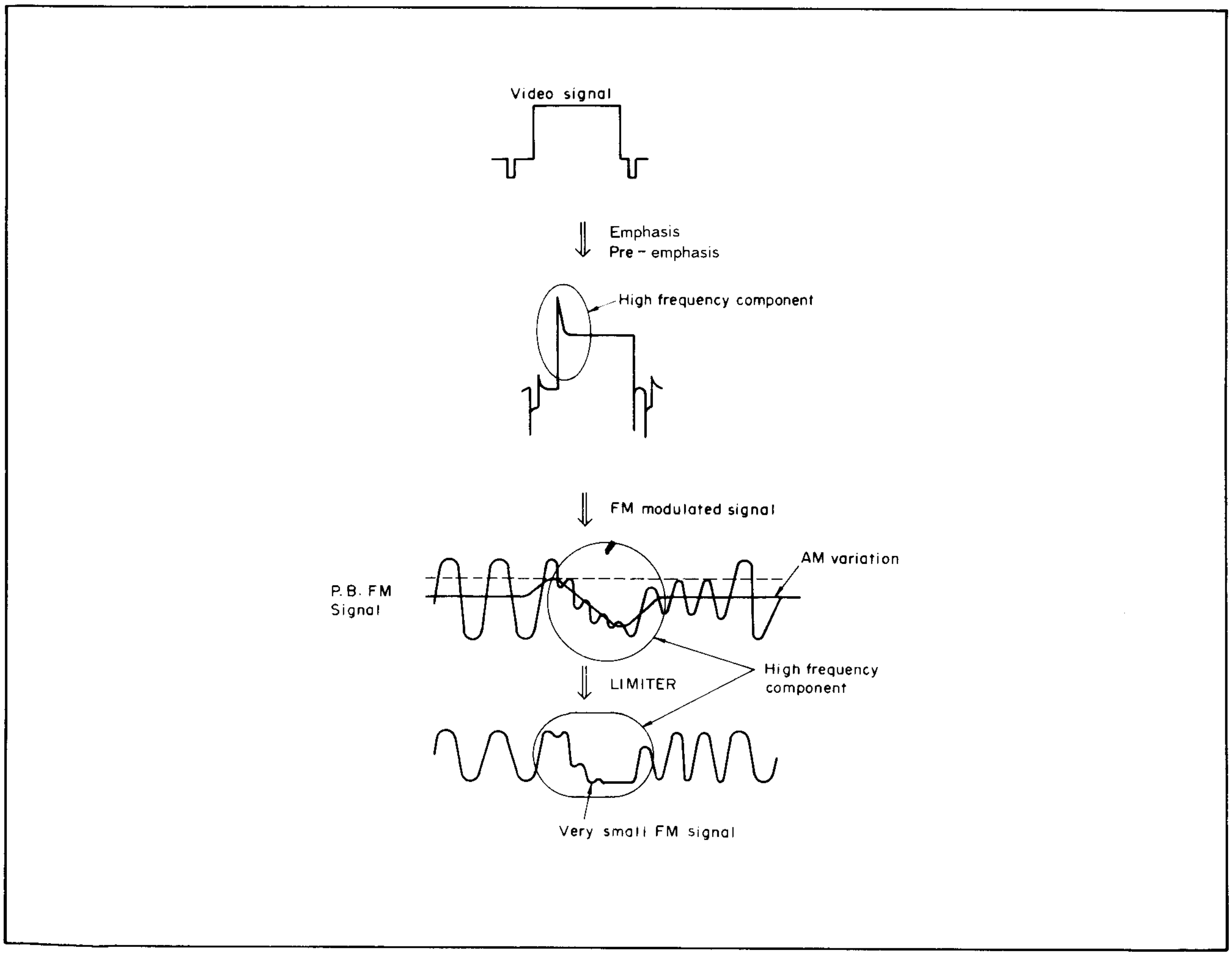
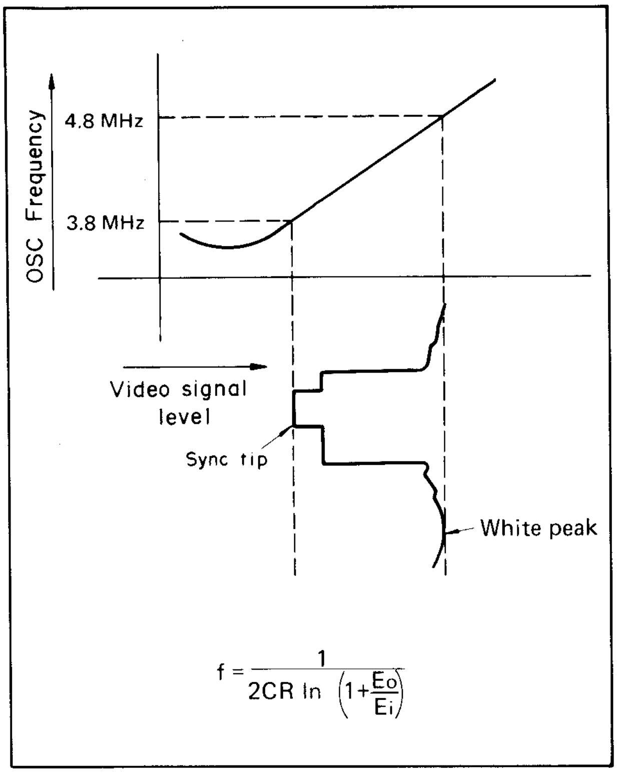

Video signal
Emphasis
Pre – emphasis
High frequency component
FM modulated signal
P.B. FM Signal
AM variation
LIMITER
High frequency component
Very small FM signal

Fig. 3-17 Limiter

After pre-processing, the video signal enters the FM modulator. This circuit employs an astable multivibrator (X1 & X2) which allows optimum narrow band frequency modulation. Oscillating frequency of the FM modulator becomes a function of the input video signal voltage as indicated in the Fig. 3-18 formula.



$$f = \frac{1}{2CR \ln\left(1+\frac{E_o}{E_i}\right)}$$

Fig. 3-18 Video to FM transfer characteristics

During monochrome recording, electronic switching circuit X8 & X9 is provided in order to bypass the high-pass filter (HPF) in order to improve resolution, as shown in Fig. 3-15.

The resulting FM signal is sent to the PRE-REC board, where (for colour) it is mixed with lowband converted colour signal and supplied via REC AMP to the video heads. See Fig. 3-19.

The recording amplifier (REC AMP) is composed of a high performance complementary type SEPP (single ended push-pull) power amplifier circuit. Since optimum recording current flowing in the video heads differs according to frequency, compensation is performed by the circuit comprised of L1, C8, R22 and R19.

[PLAYBACK]

Separate preamplifiers (IC1 and IC2) are used for each video head channel. A resonance circuit composed of head L (inductance), C18 and C19 resonates at 5.0 MHz in order to obtain maximum high frequency components from the tape.

X14 and X15 perform switching which converts the outputs of the two video heads into a single continuous signal. The signal is then filtered to become separated luminance and colour components.

Luminance circuit

Even under the best conditions, the playback FM signal contains a certain percentage of loss and reductions due to imperfections in the video tape (coating irregularities, pinholes, etc.). IC4 therefore functions as a dropout compensator and corrects for these defects by inserting the signal from the previous horizontal scanning line.

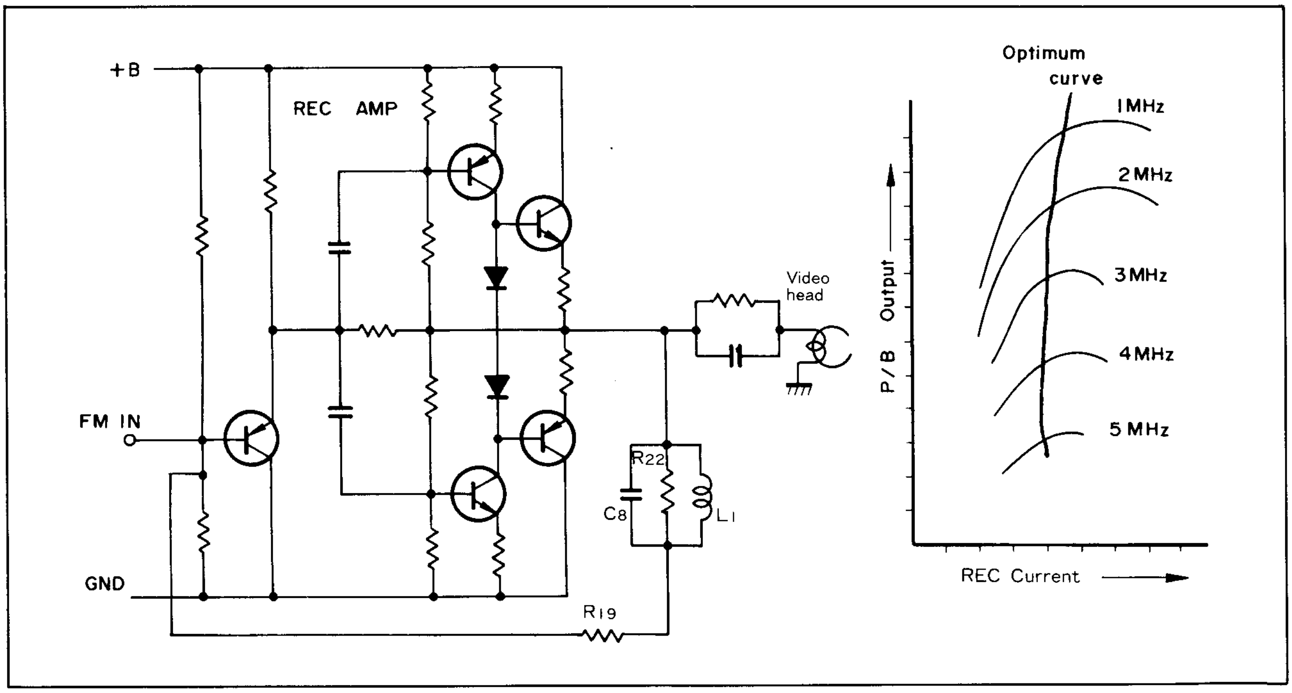


Fig. 3-19

Following dropout compensation, the FM signal is applied to a specially developed double limiter circuit. IC8 separates high frequency components from the FM signal and limiting is applied by IC7. The lowband component of the FM signal goes through IC9 emitter-follower and is then mixed with the limited high frequency component as shown in Fig. 3-20.

The mixed FM signal is again limited by IC10, then demodulated into a video signal by the delay line type FM demodulator. The resulting video signal goes through the same filters as during recording, then to IC5 high frequency compensation circuit.

A small noise component becomes introduced in the high frequency region as a result of recording and playback using frequency modulation. The aperture circuit is therefore provided to remove this noise by employing diode forward voltage.

The corrected signal is then mixed with colour signal from the colour circuit and goes to VIDEO OUT via the output amplifier.

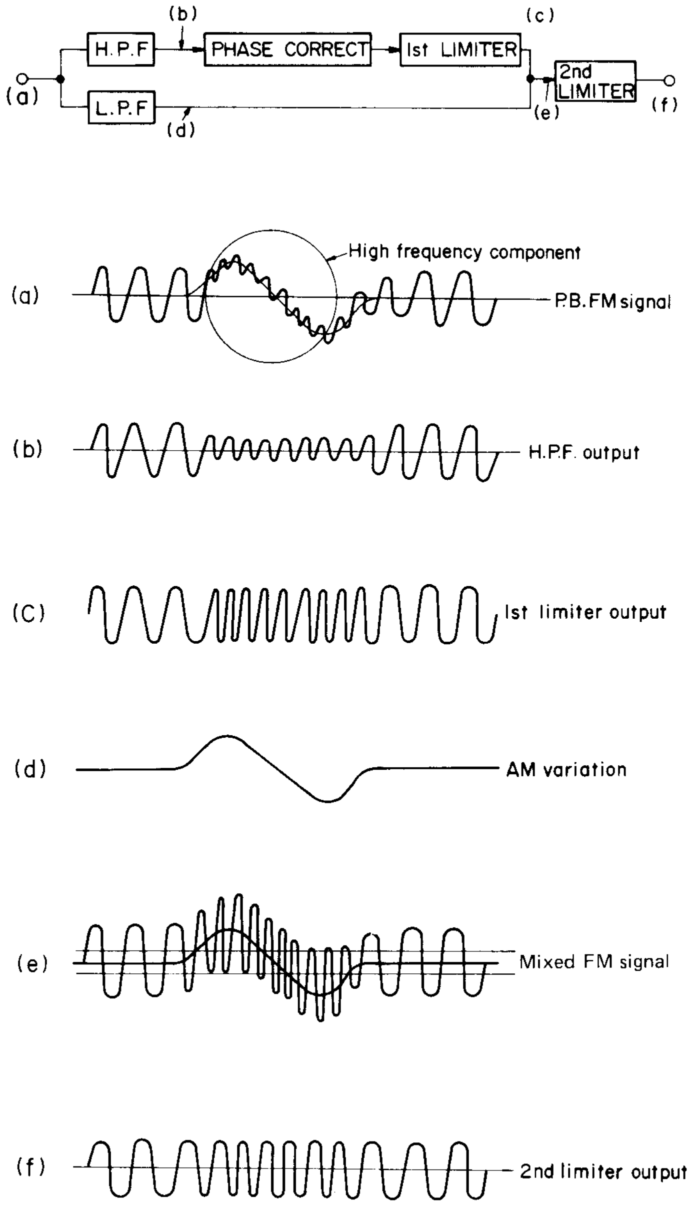

(b)
(c)
H.P.F
PHASE CORRECT
Ist LIMITER
2nd LIMITER
(a)
L.P.F
(d)
(e)
(f)
High frequency component
(a)
P.B.FM signal
(b)
H.P.F. output
(C)
Ist limiter output
(d)
AM variation
(e)
Mixed FM signal
(f)
2nd limiter output

Fig. 3-20 Double limiter

Colour circuit

See Fig. 3-21.
This circuit contains two loops: APC (automatic phase control) and AFC (automatic frequency control).

During recording, the AFC loop is an important circuit for phase shifting (PS method) the colour signal. Phase shift is preformed automatically within IC207 (MN6061A).

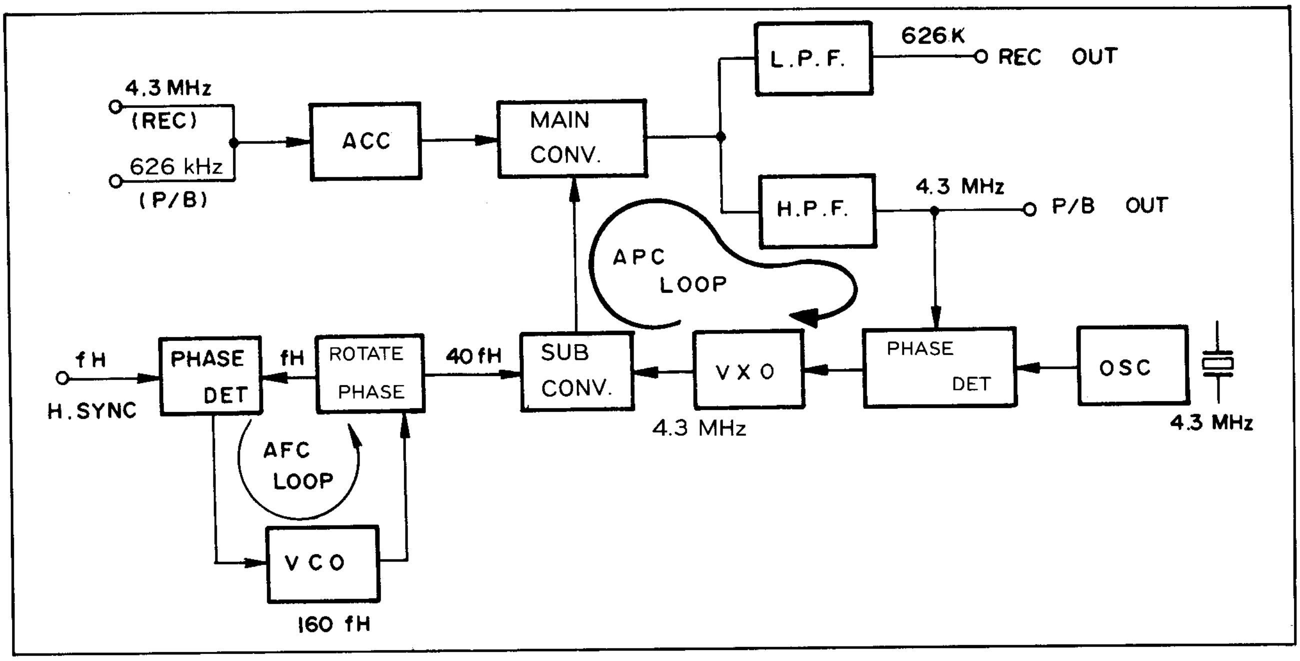
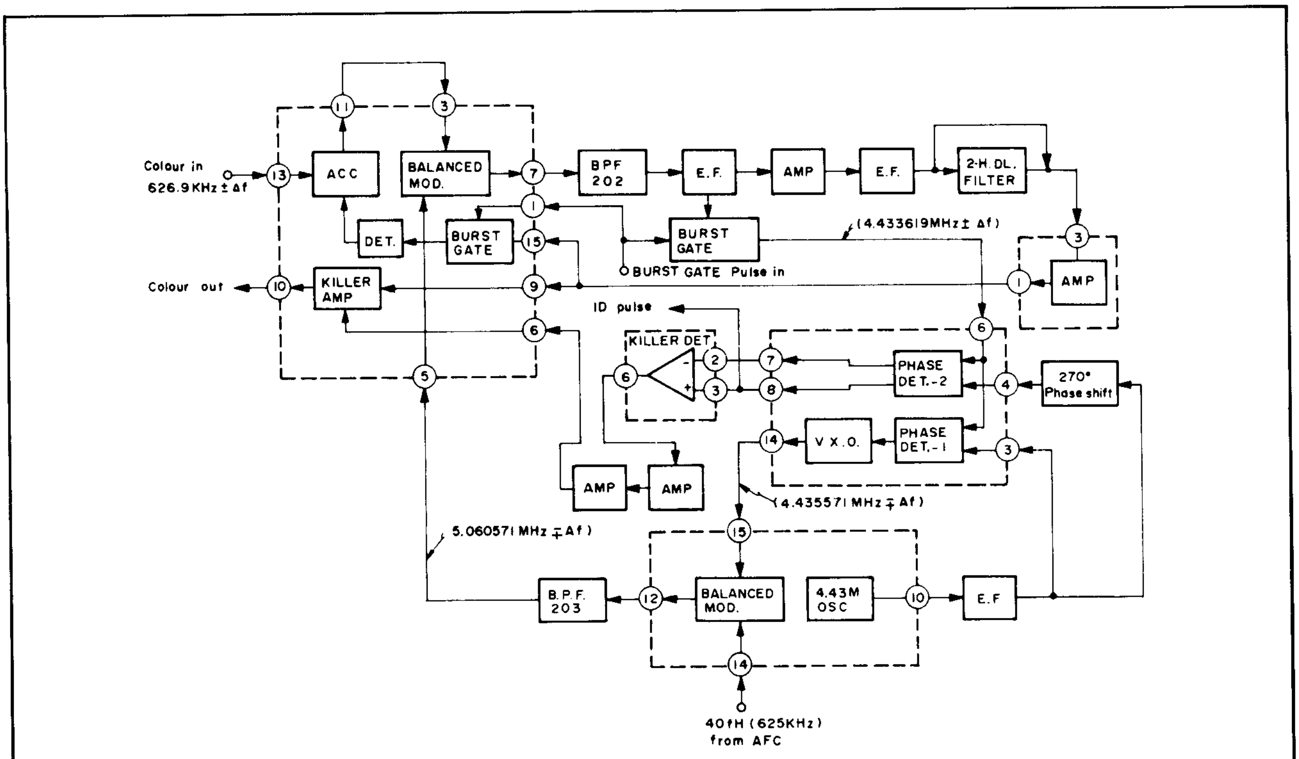

4.3 MHz
(REC)
626 kHz
(P/B)
ACC
MAIN
CONV.
L.P.F.
626K
REC OUT
H.P.F.
4.3 MHz
P/B OUT
APC
LOOP
fH
H.SYNC
PHASE
DET
fH
ROTATE
PHASE
40fH
SUB
CONV.
VXO
4.3 MHz
PHASE
DET
OSC
4.3 MHz
AFC
LOOP
VCO
160 fH

Fig. 3-21 APC and AFC loops


Colour in
626.9KHz ± Δf
ACC
BALANCED MOD.
BPF 202
E.F.
AMP
E.F.
2-H. DL. FILTER
DET.
BURST GATE
BURST GATE
(4.433619MHz ± Δf)
BURST GATE Pulse in
AMP
Colour out
KILLER AMP
ID pulse
KILLER DET
PHASE DET.-2
270° Phase shift
V X.O.
PHASE DET.-1
AMP
AMP
(4.435571 MHz ∓ Δf)
5.060571 MHz ∓ Δf)
B.P.F. 203
BALANCED MOD.
4.43M OSC
E.F
40fH (625KHz)
from AFC

KEY TO ABBREVIATIONS:
BPF : Band Pass Filter
CONV. : Converter
D.L. FILTER: Delay Line Filter
E.F. : Emitter Follower
V.X.O. : Variable X'tal Oscillator

Fig. 3-22 Block diagram of automatic phase control (APC) system

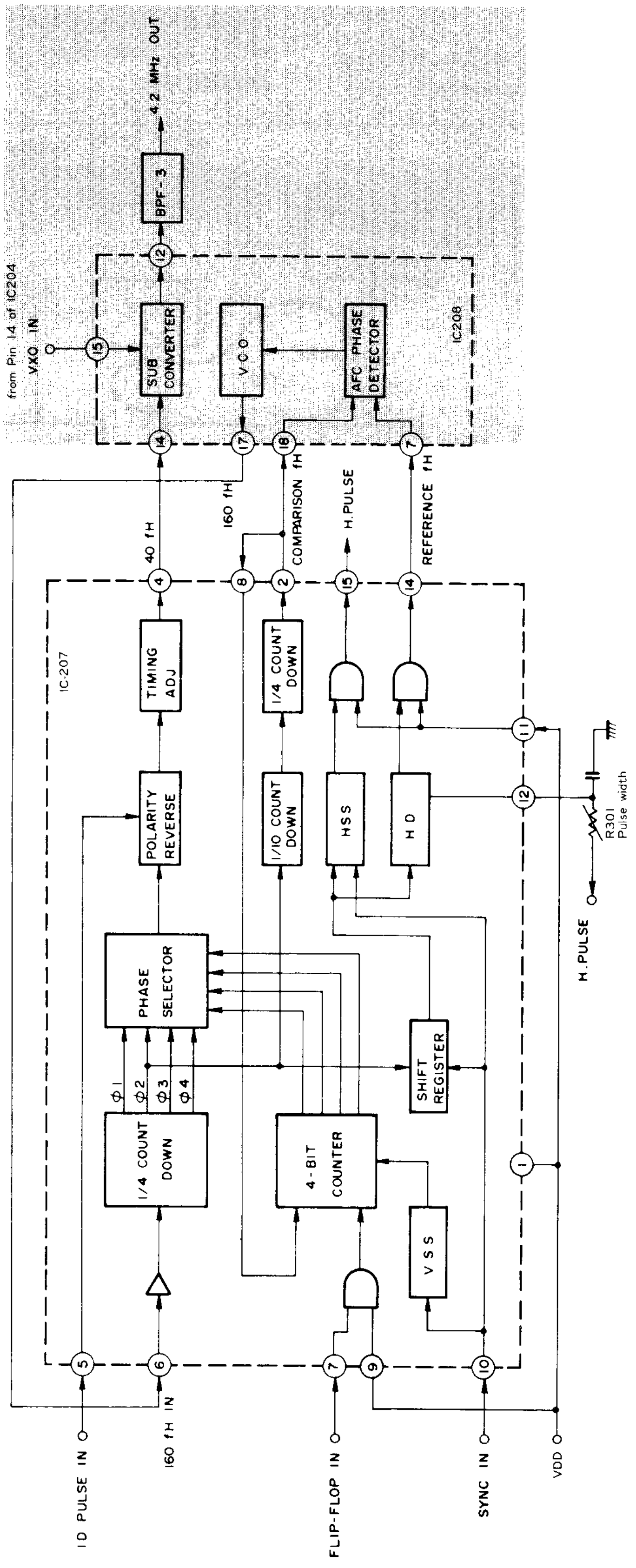

from Pin 14 of IC204
VXO IN
4.2 MHz OUT
BPF-3
SUB CONVERTER
V C O
AFC PHASE DETECTOR
IC208
15
12
14
17
18
7
40 fH
160 fH
COMPARISON fH
H.PULSE
REFERENCE fH
IC-207
TIMING ADJ
1/4 COUNT DOWN
POLARITY REVERSE
1/10 COUNT DOWN
H S S
H D
PHASE SELECTOR
φ1
φ2
φ3
φ4
SHIFT REGISTER
4-BIT COUNTER
V S S
4
8
2
15
14
11
12
1
5
6
7
9
10
R301 Pulse width
H.PULSE
I D PULSE IN
160 fH IN
FLIP-FLOP IN
SYNC IN
VDD

Fig. 3-23 Bolck diagram of IC-MN6061

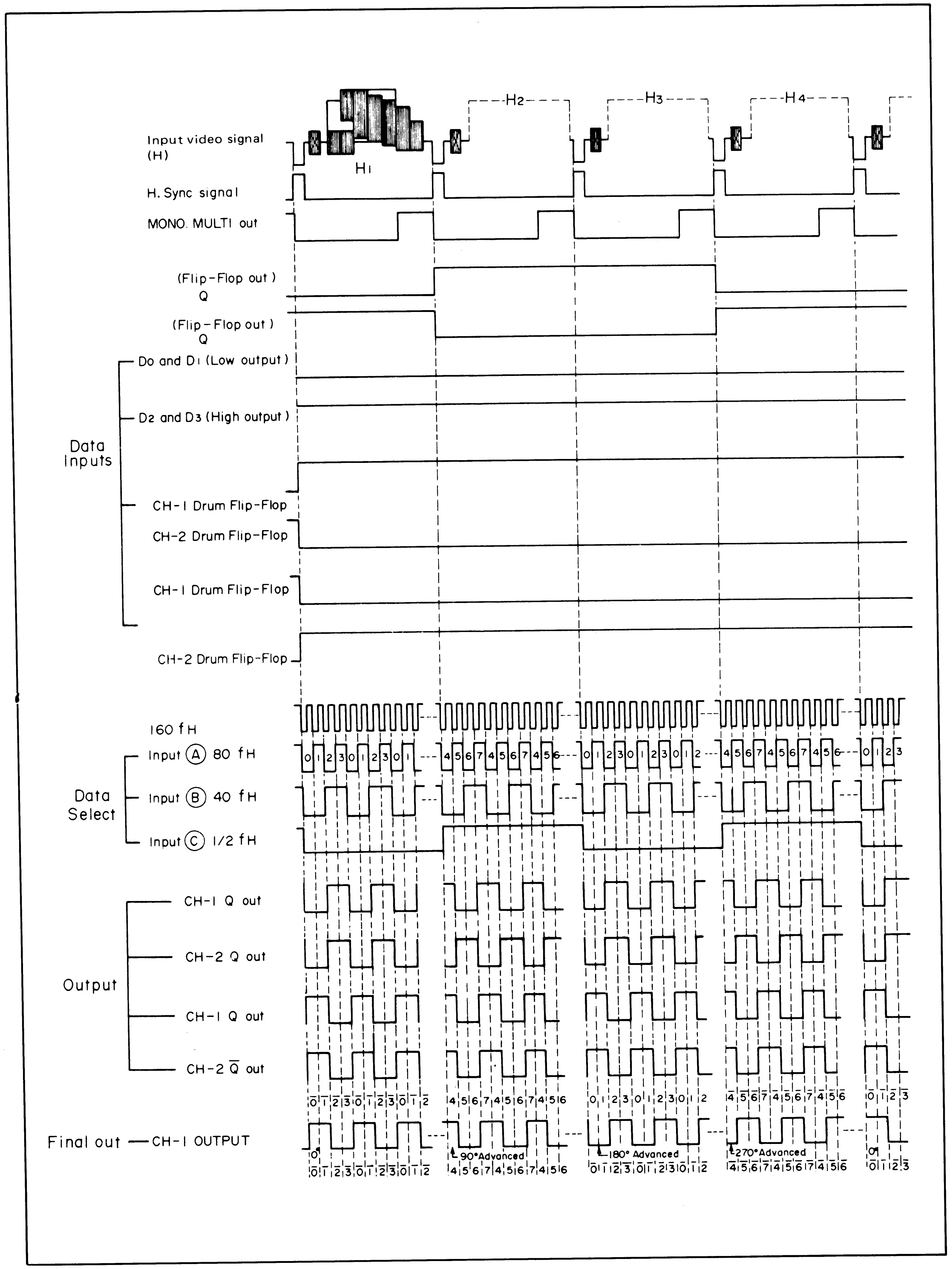

Input video signal (H)
H1
H2
H3
H4
H. Sync signal
MONO. MULTI out
(Flip-Flop out) Q
(Flip-Flop out) Q
D0 and D1 (Low output)
D2 and D3 (High output)
Data Inputs
CH-1 Drum Flip-Flop
CH-2 Drum Flip-Flop
CH-1 Drum Flip-Flop
CH-2 Drum Flip-Flop
160 fH
Input Ⓐ 80 fH
Input Ⓑ 40 fH
Input Ⓒ 1/2 fH
Data Select
CH-1 Q out
CH-2 Q out
Output
CH-1 Q out
CH-2 Q̄ out
Final out — CH-1 OUTPUT
90° Advanced
180° Advanced
270° Advanced

Fig. 3-24 Timing chart

As shown in Fig. 3-21, a PLL (phase locked loop) circuit produces a 160 fH (160 times the horizontal scanning frequency) signal which is applied to pin 6 of IC207. This is 1/4 th counted down to 40 fH and through a phase shift and selector circuit becomes obtained from pin 4.

3.3 SERVO SYSTEM

3.3.1 Outline

These systems are comprised mainly of drum and capstan servo systems. They are particularly important since they form the interface between the electrical and mechanical sections of the VCR. Also note that an adequate understanding of the mechanical section functions is essential prior to performing service and adjustments of the servo systems.

The drum servo functions to control the rotation of video head drum. During recording, phase comparison is performed between the input signal and drum rotation to ensure that the recorded tape pattern complies with VHS specifications. During playback, phase comparison between drum rotation and the recorded control (CTL) signal is preformed in order to match the video heads with the tape pattern.

The capstan servo operates to main constant tape transport speed. A crystal oscillator produces a reference 2.5 MHz which is frequency divided. Phase comparison is performed between this divided frequency and capstan rotation.

Discriminator servos, utilizing DC motor reverse EMF (electromotive force), are provided for both drum and capstan servo systems.

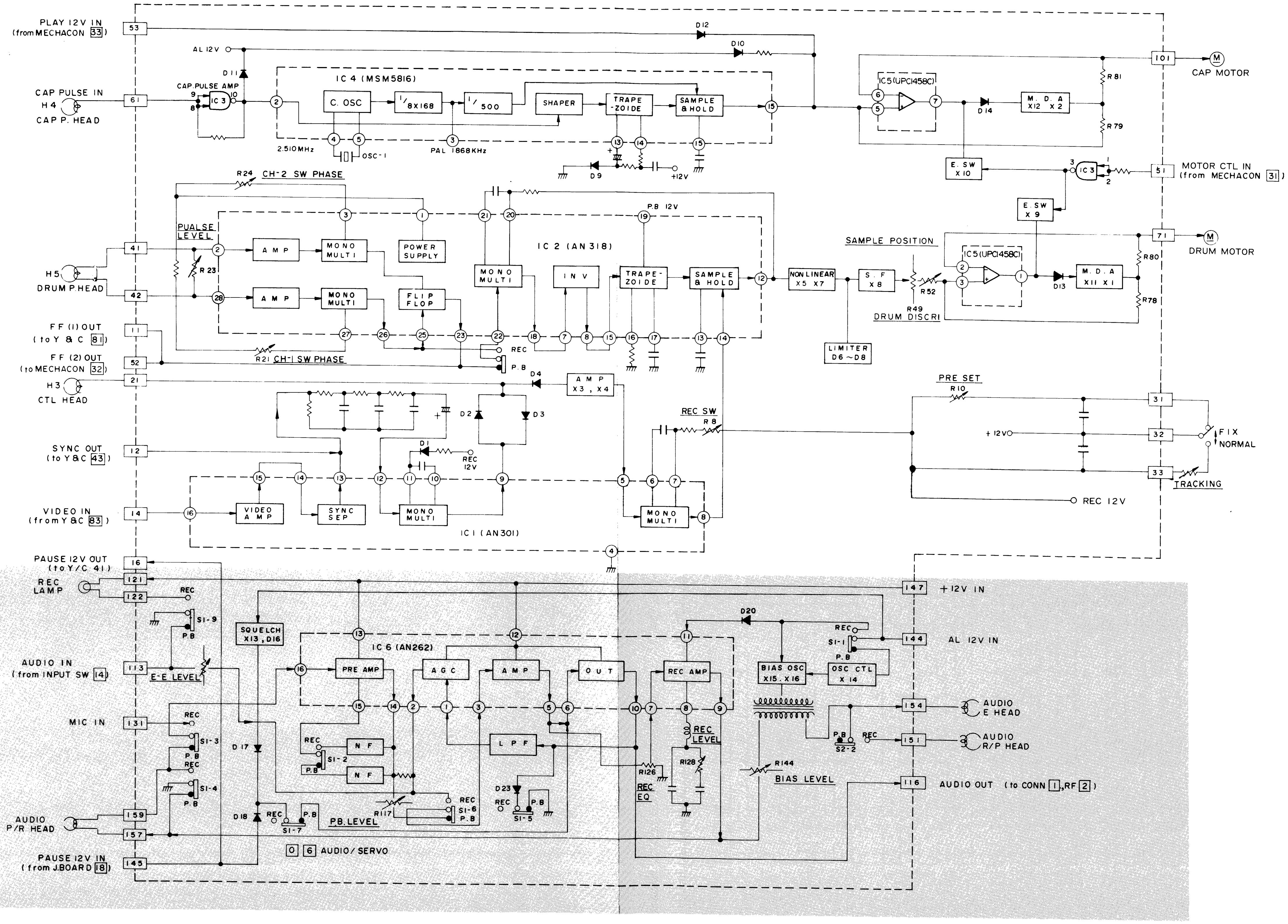

PLAY 12V IN
(from MECHACON 33)
CAP PULSE IN
H4
CAP P. HEAD
AL 12V
D11
CAP PULSE AMP
IC 3
IC 4 (MSM5816)
C. OSC
1/8x168
1/500
SHAPER
TRAPE -ZOIDE
SAMPLE & HOLD
2.510MHz
OSC-1
PAL 1868KHz
D9
+12V
D12
D10
IC5(UPC1458C)
D14
M. D. A X12 X2
R81
R79
101
CAP MOTOR
E. SW X10
IC 3
MOTOR CTL IN
(from MECHACON 31)
E SW X9
R24 CH-2 SW PHASE
PUALSE LEVEL
R 23
H5
DRUM P.HEAD
A M P
MONO MULTI
POWER SUPPLY
FLIP FLOP
IC 2 (AN318)
P.B 12V
I N V
TRAPE-ZOIDE
SAMPLE & HOLD
NON LINEAR X5 X7
S. F X8
SAMPLE POSITION
R52
R49 DRUM DISCRI
IC5(UPC1458C)
D13
M. D. A X11 X1
R80
R78
71
DRUM MOTOR
LIMITER D6~D8
F F (1) OUT
(to Y & C 81)
F F (2) OUT
(to MECHACON 32)
H3
CTL HEAD
R21 CH-1 SW PHASE
REC
P.B
D4
A M P X3, X4
D2
D3
REC SW
R8
PRE SET
R10
+12V
31
32
33
FIX
NORMAL
TRACKING
REC 12V
SYNC OUT
(to Y&C 43)
D1
REC 12V
VIDEO IN
(from Y&C 83)
VIDEO AMP
SYNC SEP
MONO MULTI
IC1 (AN301)
PAUSE 12V OUT
(to Y/C 41)
REC LAMP
S1-9
AUDIO IN
(from INPUT SW 14)
E-E LEVEL
SQUELCH X13, D16
IC 6 (AN262)
PRE AMP
A G C
A M P
O U T
REC AMP
D20
BIAS OSC X15, X16
OSC CTL X14
S1-1
147
+12V IN
144
AL 12V IN
MIC IN
S1-3
S1-4
S1-2
N F
L P F
D17
D18
S1-7
R117
P.B. LEVEL
S1-6
D23
S1-5
R126
REC EQ
REC LEVEL
R128
R144
BIAS LEVEL
S2-2
154
AUDIO E HEAD
151
AUDIO R/P HEAD
116
AUDIO OUT (to CONN 1, RF 2)
AUDIO P/R HEAD
PAUSE 12V IN
(from J.BOARD 18)
0 6 AUDIO/SERVO

Fig. 3-25 Servo Block Diagram

3.3.2 Drum servo system

Refer to Fig. 3-26.

Video signal reference from the Y & COLOUR board is applied to pin 14 of the servo board. In IC1 a monostable multivibrator converts separated 50 Hz vertical sync into a 25 Hz squarewave. This squarewave goes to the CTL head during recording to become the CTL signal. See Fig. 3-27.

Pulse output from pickup heads (mounted on bottom of drum) goes to monostable multivibrator IC2 (AN318). This is shaped by a flipflop circuit to become a trapezoidal waveform. Phase comparison is performed between this trapezoidal waveform and the vertical sync component of the input video signal. The phase detector

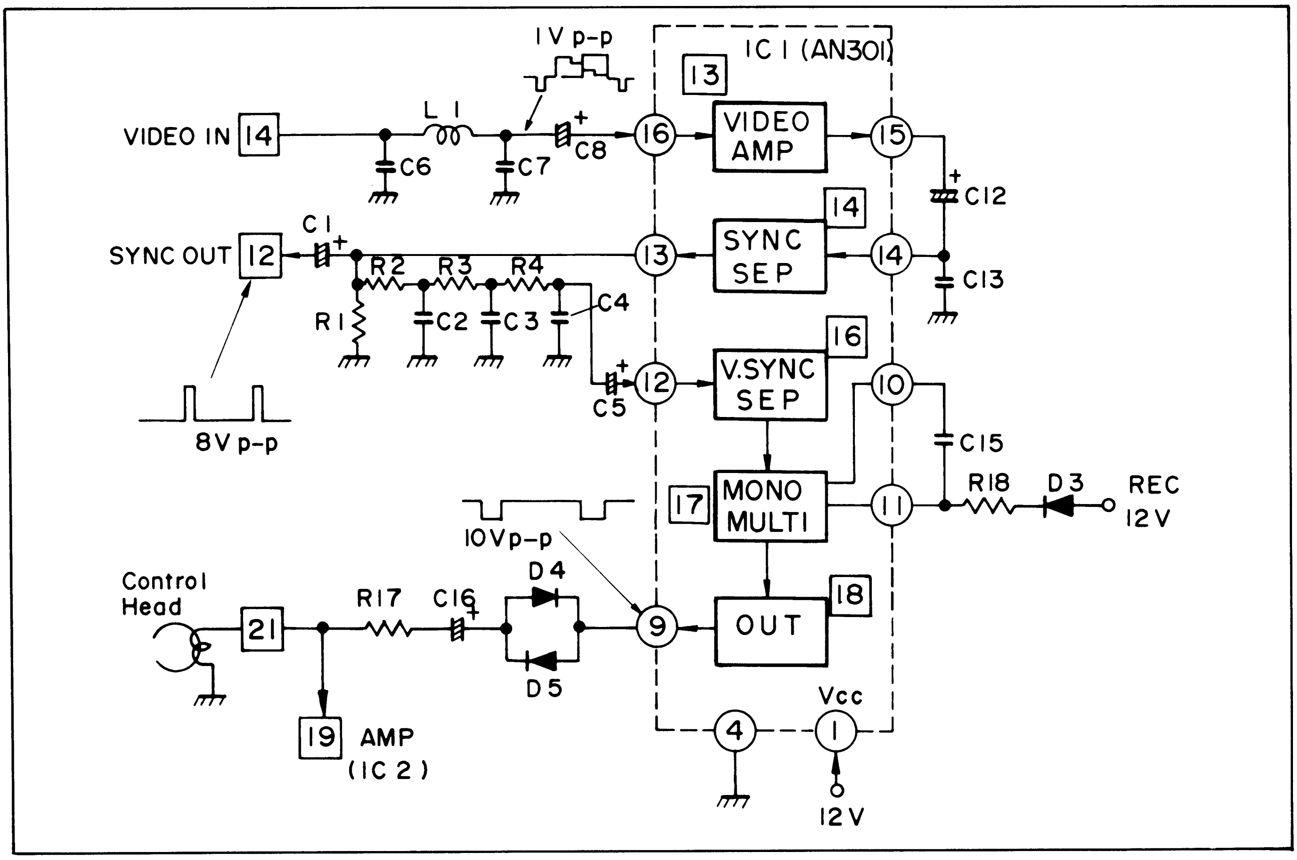

1V p-p
IC 1 (AN301)
13
VIDEO IN
14
L 1
C6
C7
C8
16
VIDEO AMP
15
C12
14
C 1
SYNC OUT
12
R2
R3
R4
13
SYNC SEP
14
C13
C4
R 1
C2
C3
16
12
V.SYNC SEP
10
C5
8V p-p
C15
R18
D3
REC 12V
17
MONO MULTI
11
10Vp-p
D4
Control Head
R17
C16
18
21
9
OUT
D5
Vcc
19
AMP (IC 2)
4
1
12V

Fig. 3-26 IC-1 circuit

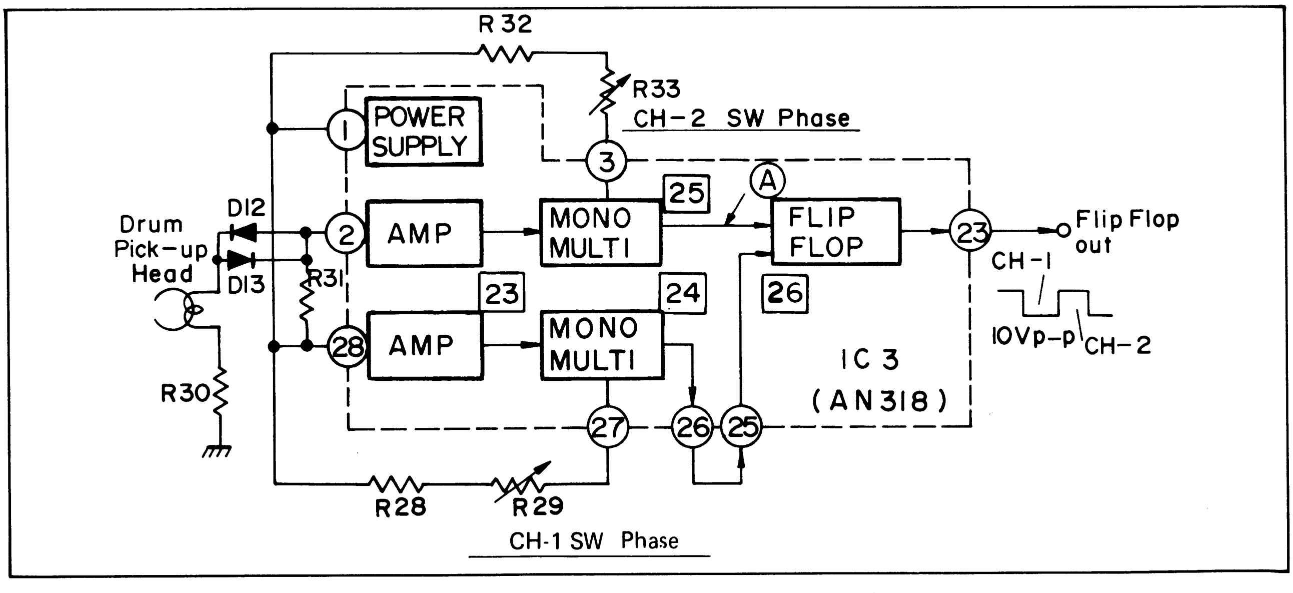

R32
R33
CH-2 SW Phase
1
POWER SUPPLY
3
25
A
Drum Pick-up Head
D12
2
AMP
MONO MULTI
FLIP FLOP
23
Flip Flop out
D13
R31
23
24
26
CH-I
28
AMP
MONO MULTI
10Vp-p
CH-2
IC 3 (AN318)
R30
27
26
25
R28
R29
CH-1 SW Phase

Fig. 3-27 Reference signal generating circuit

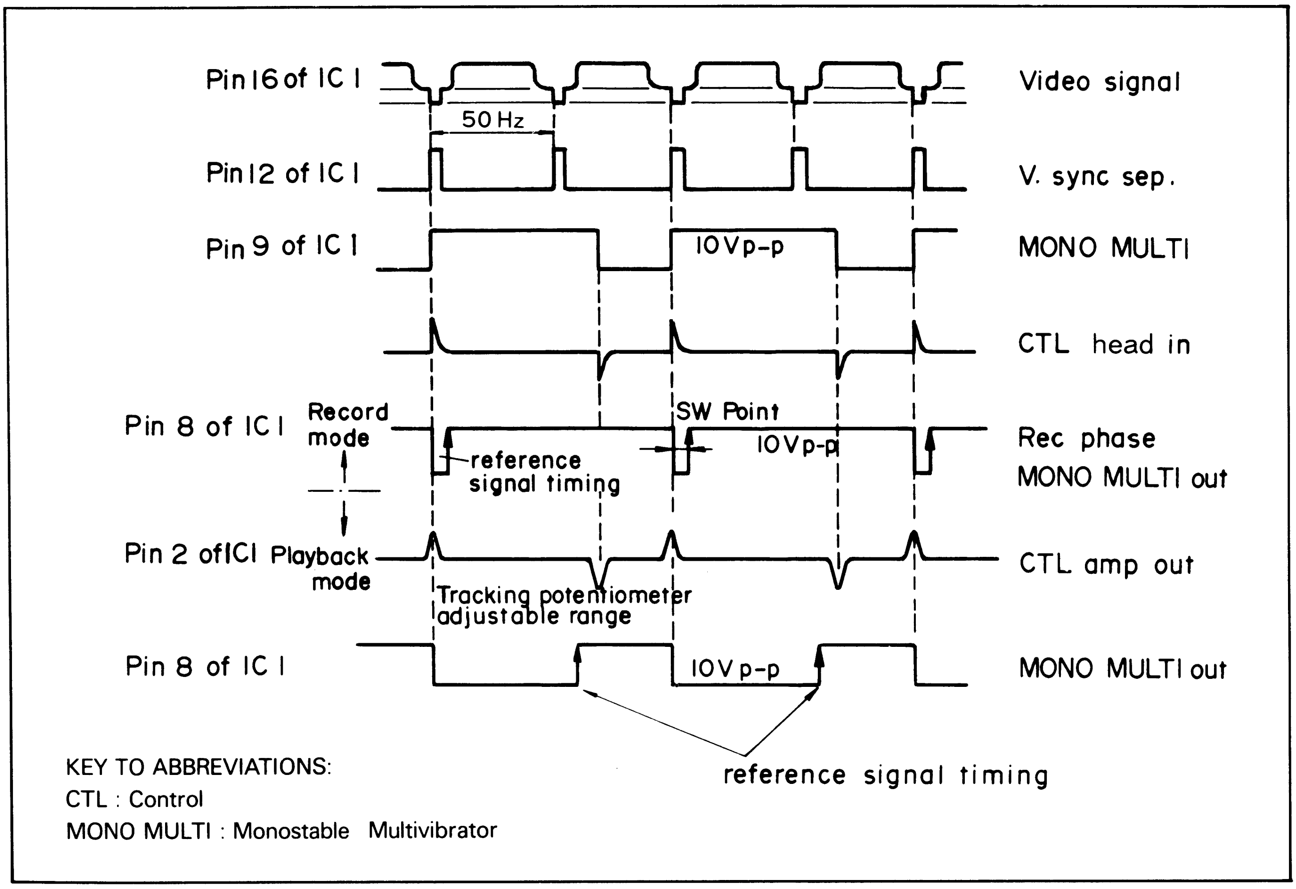


Fig. 3-28 Reference signal timing chart

output is then converted into a voltage and appears at IC2 pin 12.

The phase error voltage is applied to the discriminator circuit as control voltage. Reverse EMF produced during DC motor rotation is employed to control the rotation rate. As the rate increases, the reverse EMF also increases. This increase is detected and used to control the voltage applied to the DC motor.

Servo circuit timing chart is shown in Fig. 3-28.

3.3.3 Capstan servo system

Refer to Fig. 3-29.

Capstan servo reference is a 2.5 MHz crystal oscillator. Output of the oscillator is divided 1/8 x 1/28 x 1/500 to become a 3.72 Hz reference signal.

Two magnets are mounted on the capstan flywheel. As the flywheel rotates, these are detected by a pickup head and the resulting pulse goes to IC4. In IC4, a trapezoidal waveform is produced from this pulse and compared in phase to the 3.72 Hz reference frequency. This output is applied to the discriminator servo crcuit.

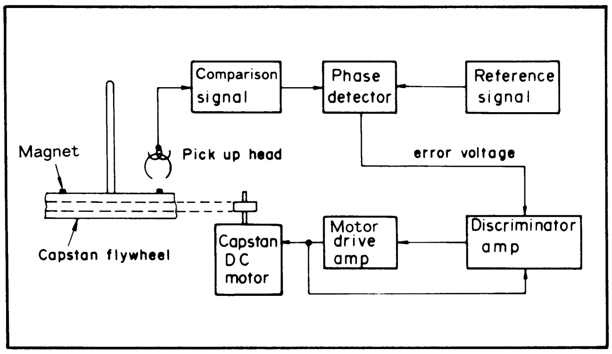


Fig. 3-29 Capstan servo system principle

Discriminator circuit:

This circuit functions on the balanced bridge principle and utilizes a differential amplifier to produce an output voltage which in turn equalizes the two input voltages. Output E_O of the motor drive amplifier (MDA) is divided between R1 and R2. In R2 circuit, this voltage is modified by R2, motor internal resistance and motor reverse EMF to yield voltage E_m.

In the R1 circuit, voltage E_O is modified by R1, voltage from the phase control circuit and R3 to become voltage E_C. By using E_m as the negative and E_C as the positive

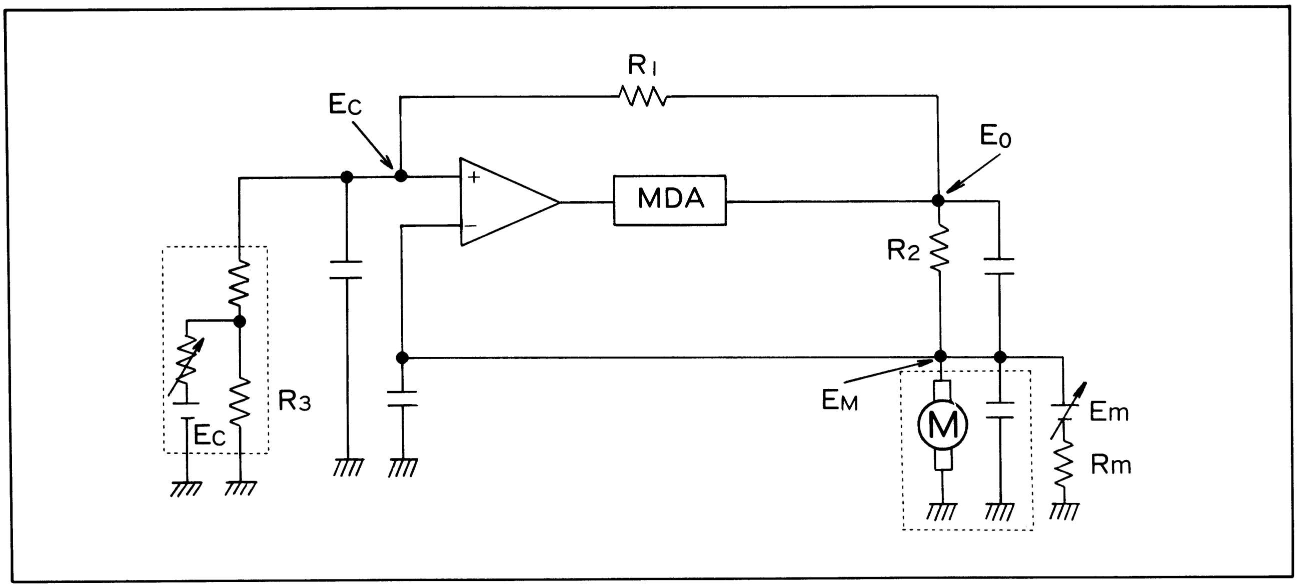


Fig. 3-30 Discriminator servo circuit

inputs of the differential amplifier, the circuit functions to maintain Em = Ec.

For example, assume that motor rotation increases. As Em increases and becomes greater than Ec, voltage Eo declines. Consequently, voltage applied to the motor becomes reduced and motor rotation declines. This in turn reduces Em to where it is equal to Ec.

3.4 MECHANISM CONTROL CIRCUIT

3.4.1 Outline

This circuit is distributed among six circuit boards: MECHACON, junction, start sensor, end sensor, takeup (TU) reel disk and operation boards.

The MECHACON board coordinates VHS operation and the VCR mechanism. The IC design of this circuit contributes to both compactness and high reliability.

3.4.2 Control objectives

1. All operations become inhibited when cassette is absent.
2. In event cassette detector lamp fails, all operations become inhibited. If the lamp fails while tape is in motion, the mode in progress becomes released and (after unloading) stop mode is obtained.
3. When transparent trailer portion of the tape is reached during play (record), the mode becomes released and stop mode obtained. At this time, modes other than REW (rewind) are inhibited.
4. During rewind, when transparent leader portion of tape is reached, the mode becomes released and stop mode obtained. At this time, REW mode becomes inhibited.
5. If search switch is ON and 000 counter indication is reached during REW mode, stop mode becomes obtained. This provides convenient operation since by setting the counter to 000 prior to recording, the beginning of the program segment can be easily located after the recording has been completed.
6. In absence of power (power switch off or power cord disconnected), only the stop mode is enabled. If power is interrupted during play (REC) mode, then resupplied, the unloading sequence becomes automatically performed and stop mode obtained.
7. If takeup reel rotation stops during play, FF (fast forward) or REW (rewind), stop mode becomes obtained automatically approx. 13 seconds later. However, this limitation is not applied to pause/still.
8. In order to protect the tape and motor, if drum rotation stops during play, the stop mode is obtained automatically approx. 13 seconds later.
9. If FF or REW key is pressed while power is absent, the command becomes released when power is supplied.
10. When stop signal is produced by the mechanism control circuit and an operating mode key held depressed, the stop solenoid operates repeatedly at approx. 0.5 second intervals.

3.4.3 IC equivalent circuit

Equivalent circuit of the MECHACON board IC is shown in Fig. 3-31. Although in event of malfunction, the IC is replaced rather than repaired, the circuit diagram forms a useful reference.

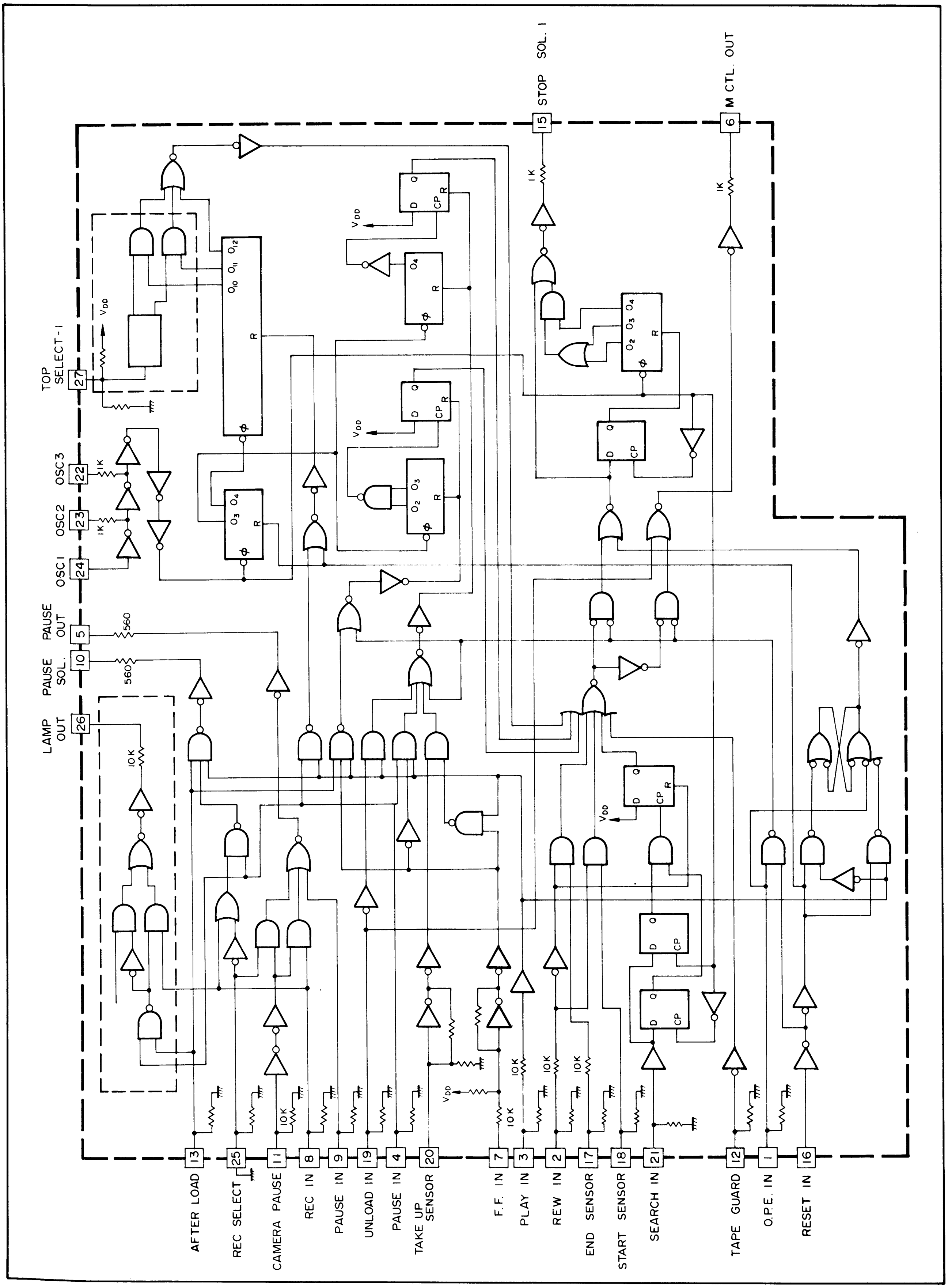

TOP SELECT-1
27
OSC3
22
OSC2
23
OSC1
24
PAUSE OUT
5
PAUSE SOL.
10
LAMP OUT
26
15
STOP SOL. 1
6
M CTL. OUT
13
AFTER LOAD
25
REC SELECT
11
CAMERA PAUSE
8
REC IN
9
PAUSE IN
19
UNLOAD IN
4
PAUSE IN
20
TAKE UP SENSOR
7
F.F. IN
3
PLAY IN
2
REW IN
17
END SENSOR
18
START SENSOR
21
SEARCH IN
12
TAPE GUARD
1
O.P.E. IN
16
RESET IN
1K
10K
560
V_{DD}
D
Q
CP
R
ϕ
O_{10}
O_{11}
O_{12}
O_2
O_3
O_4

Fig. 3-31 Block diagram of MECHACON IC

SECTION 4
DISASSEMBLY

4.1 CHASSIS REMOVAL

1. Remove the two screws ① on the top cover as shown in Fig. 4-1.
   Then lift the top cover.

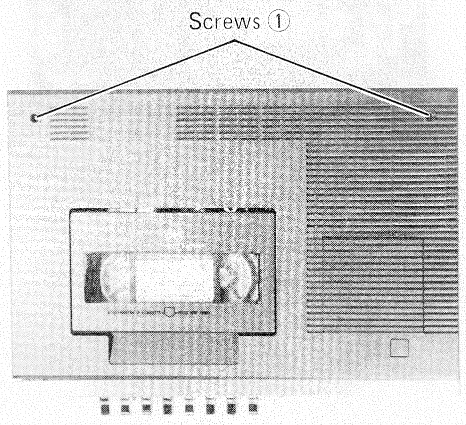


Fig. 4-1

2. Remove the two screws ② and two screws ③ from the side panel.

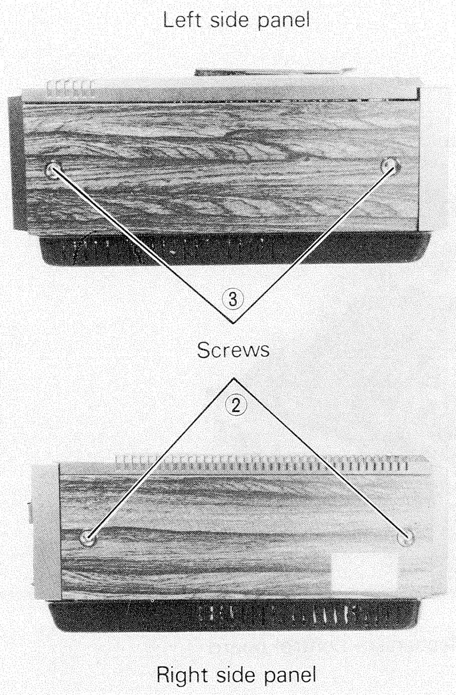

Left side panel
③
Screws
②
Right side panel

Fig. 4-2

3. Remove the six screws ④. Then remove the rear panel.

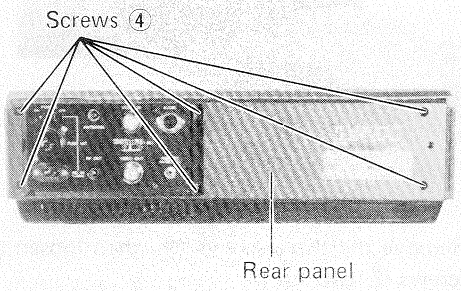

Screws ④
Rear panel

Fig. 4-3

4. Remove the four screws ⑤. Then remove the bottom cover.

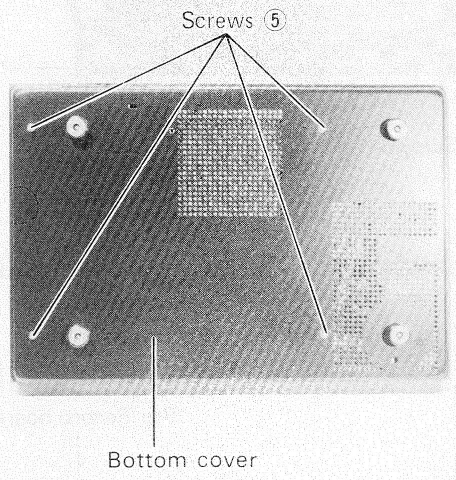

Screws ⑤
Bottom cover

Fig. 4-4

5. Push the tips timer by frngers as shown Fig. 4-5A.

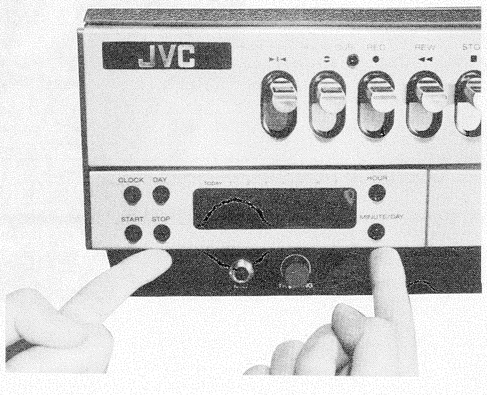


Fig. 4-5A

Pull out the timer from the recorder.
Disconnect the timer connector from the VHS receptacle.

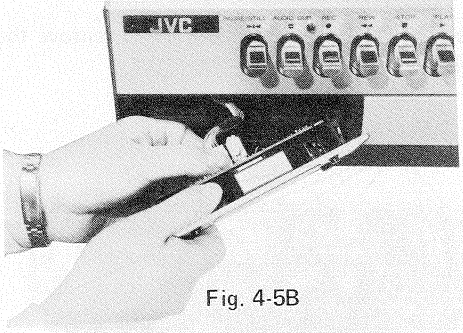

JVC
PAUSE/STILL
AUDIO DUB
REC
REW
STOP
PLAY

Fig. 4-5B

Remove the three screws ⑥, then loosen the two screws ⑦ two turns.

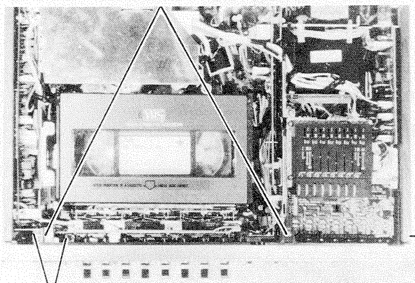

Screws ⑥
Screws ⑦

Fig. 4-5C

6. Remove the four screws ⑧, then remove the cassette housing assembly.

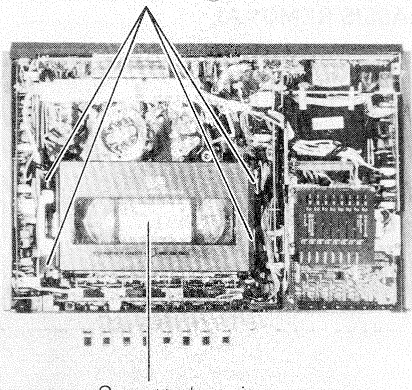

Screws ⑧
Cassette housing

Fig. 4-6

4.2 REMOVAL OF PRINTED CIRCUIT BOARD

4.2.1 Layout of the printed circuit board

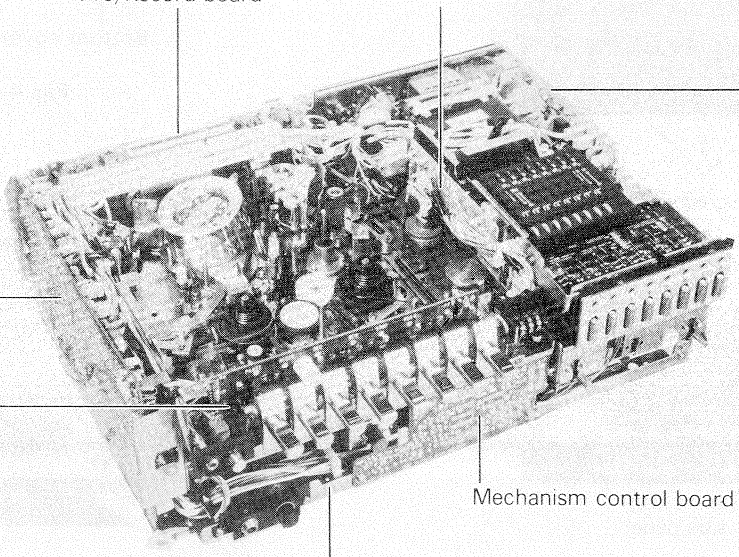

Pre/Record board
Junction board
Regulator board
Audio/Servo (A/S) board
Operation board
Mechanism control board
Luminance/Chrominance (Y/C) board

Fig. 4-7

4.2.2 Audio/Servo (A/S) printed circuit board

1. Remove the two screws ① on the printed circuit board as shown in Fig. 4-8.

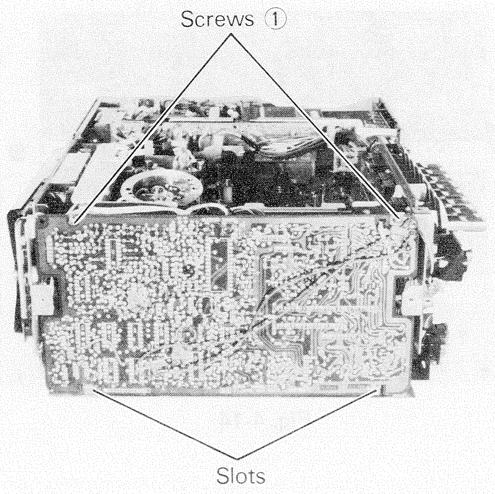


Fig. 4-8

2. Remove the printed circuit board by ensuring that slots are out of chassis and then gently pulling outward.
3. Disconnect the connectors from the board.
4. When mounting the Audio/Servo and other printed circuit boards, be sure to connect the correspondingly numbered connectors to the pins on the board.
   Also when mounting the Audio/Servo printed circuit board to the chassis, make sure that the two slide switch activating levers, located near the middle of the printed circuit board, are manually fully leftward, and take care not to pinch the wires when mounting.

4.2.3 Pre/Record (PRE/REC) printed circuit board

1. Remove the four screws ② on the printed circuit board as shown in Fig. 4-9.

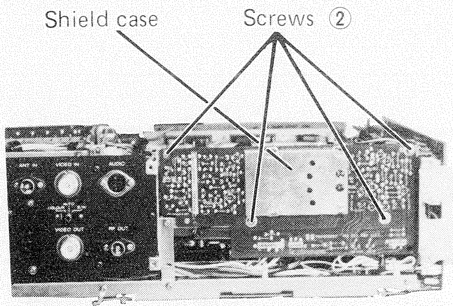


Fig. 4-9

2. Disconnect the numbered connectors on the printed circuit board.
3. Remove the shield case by using a soldering iron, and unsolder the two wires located inside of the shield case as shown in Fig. 4-9.

4.2.4 Luminance/Chrominance (Y/C) printed circuit board

1. Remove the two screws ③ on the printed circuit board as shown in Fig. 4-10.

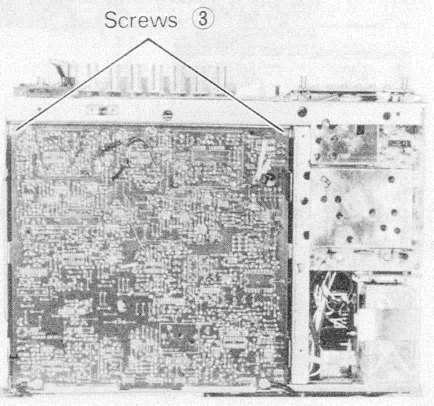


Fig. 4-10

4.2.5 Mechanism control circuit board

1. Remove the two screws ④ on the printed circuit board as shown in Fig. 4-11.

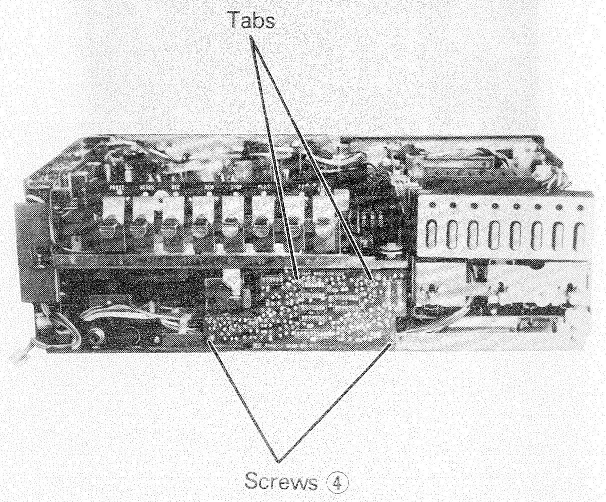


Fig. 4-11

2. Remove the printed circuit board by ensuring that tabs are out of chassis and gently pulling outward.
3. Disconnect the numbered connectors on the printed circuit board.

4.2.6 Regulator printed circuit board

1. Remove the three screws ⑥ on the printed circuit board as shown in Fig. 4-12.

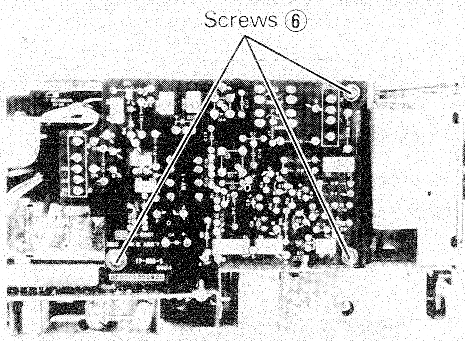


Fig. 4-12

2. Disconnect the connectors on the printed circuit board.

4.2.7 Tuner assmbly

1. Remove the two screws ⑧ on the tuner assembly as shown in Fig. 4-13.
2. Disconnect the connectors on the printed circuit board.

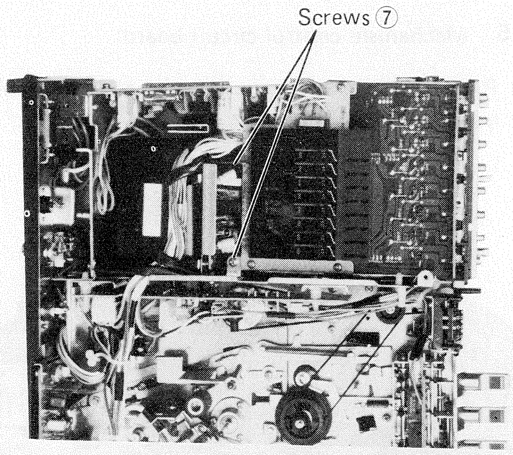


Fig. 4-13

3. Remove the four screws ⑨ on the printed circuit board as shown in Fig. 4-14.

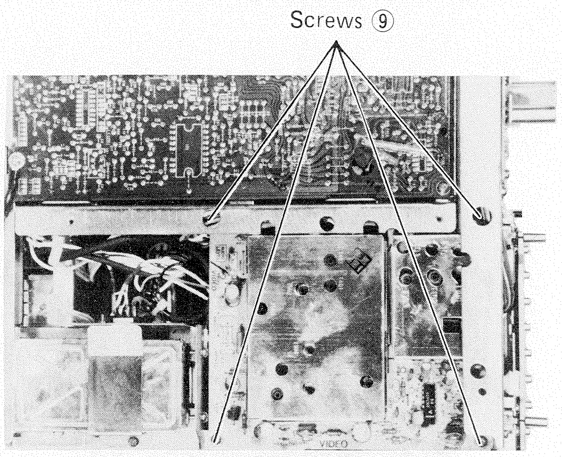


Fig. 4-14

SECTION 5
MECHANICAL ADJUSTMENTS

5.1 PRECAUTIONS

WARNING

1. *Always turn the power off before removing or soldering components.*
2. *When removing a screw from the chassis, be careful not to drop it into the mechanism. If a screw should be dropped, be sure to retrieve it.*
3. *Be extremely careful not to damage either the upper or lower head drum assemblies.*
4. *The tape transport mechanism has been precisely adjusted at the factory and ordinarily does not require readjustment.*
5. *When removing a part, be very careful not to damage or displace other parts. (Be especially careful with the guide poles and rotary video head drum.)*
6. *To check the mechanism without a tape, lock the cassette microswitch (S12). Also disable the photo transistor sensors by applying opaque covers.*

NOTE: *After completing checks and repairs, be sure to remove the covers.*

5.2 PERIODIC MAINTENANCE

The following components require periodic cleaning and lubrication to maintain normal efficiency.

5.2.1 Cleaning

Drum system

1. Use a lint free cloth dampened with alcohol to clean the upper and lower drums, the full-erase head, the two guide poles and two guide rollers. Since these parts contact the video tape directly, they tend to collect dust.

WARNING

When cleaning the two video heads on the upper drum, DO NOT clean them with a vertical stroke. Use only a gentle back and forth motion, in the direction of the tape path. Perform carefully, since the heads are easily damaged.

2. The drum system should be cleaned after every 400–500 hours of use.
3. After cleaning with alcohol, allow the parts to dry before using a cassette tape since alcohol may impair the tape.

Pinch roller and capstan shaft

1. Dust on the pinch roller or the capstan shaft can impair operation.
2. Clean the pinch roller tire and capstan shaft with alcohol and a lint-free cloth.

NOTE: *Alcohol can deteriorate rubber.*

Reel drive system

Surfaces of the following components require periodic cleaning. (Refer to Fig. 5-1(a).)

1. Supply reel disk ㉗
2. Rewind idler ㉓
3. F.F. idler ㉑
4. Unloading idler ㉕

Motor drive system

The following components require periodic cleaning. Drum pulley, drum belt, drum motor pulley, capstan motor pulley, relay belt, relay pulley, capstan pulley, capstan flywheel, reel drive belt, unloading belt, take-up pulley, rewind pulley, unloading pulley.

5.2.2 Lubrication

The following points should be lubricated with JVC oil (Part No. PU41761) or other high quality spindle oil every 2000 hours.

Shafts of counter idler pulley,
Take-up and supply reel disks.

WARNING

DO NOT overlubricate. Two or three drops of oil in each location is sufficient.

5.3 LAYOUT OF MAIN MECHANICAL PARTS

1) Top view and parts identification

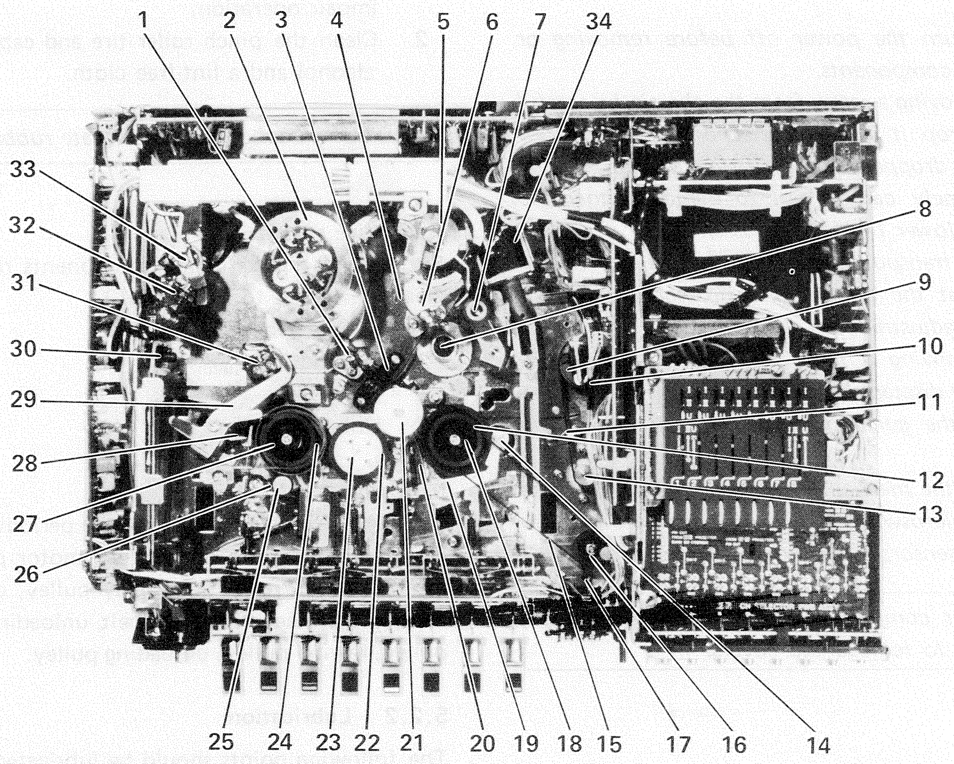


Fig. 5-1(a) Top view

1. Take-up loading arm
2. Upper drum (Video heads)
3. Cassette lamp
4. Audio erase head
5. Take-up impedance roller
6. Audio/control head
7. Pinch roller
8. Capstan shaft
9. Start sensor
10. Relay pulley
11. Relay belt
12. Take-up reel disk rubber tire
13. Capstan motor pulley
14. Take-up idler
15. Counter belt-1
16. Counter pulley
17. Counter belt-2
18. Take-up reel disk
19. Take-up brake
20. Loading brake
21. F.F. idler
22. REW rubber tire
23. REW idler ass'y
24. Tension band
25. Unloading idler ass'y
26. Unloading idler rubber tire
27. Supply reel disk
28. Loading tension brake
29. Tension arm
30. End sensor
31. Supply loading arm
32. Full erase head
33. Supply impedance roller
34. Pinch roller solenoid

2) Bottom view and parts identification

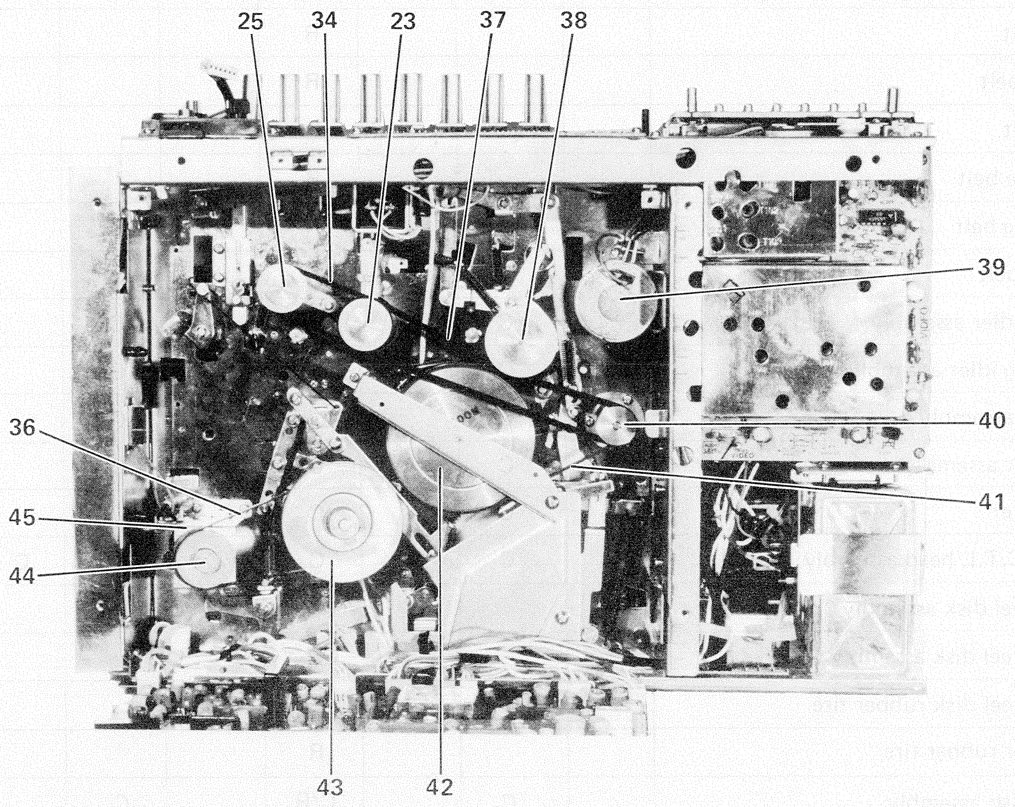

25
34
23
37
38
39
40
41
36
45
44
43
42

Fig. 5-1(b) Bottom view

35. Unloading belt
36. Drum belt
37. Reel drive belt
38. Take-up idler
39. Capstan motor
40. Relay pulley
41. Capstan belt
42. Capstan flywheel
43. Drum pulley
44. Drum motor pulley
45. Drum motor

Operating hours Name	500	1000	1500	2000	2500	3000	3500	4000	5000
Upper drum assembly	C	CR	C	C/R	C	C/R	C	C/R	C/R
Relay belt				R				R	
Capstan belt				R				R	
Drum belt				R				R	
Reel drive belt				R				R	
Unloading belt				R				R	
Counter belt				R				R	
Take-up idler assembly		C		C/R		C		C/R	
Unloading idler assembly		C		C/R		C		C/R	
F.F idler assembly		C		C/R		C		C/R	
Rew. idler assembly		C		C		C			
Pinch roller		C		C		C/R		C	C
AUDIO/C.T.L head assembly	C	C	C	C	C	C/R	C	C	C
Supply reel disk assembly				C/L				C/L	
Take-up reel disk assembly				C/L				C/L	
Take-up reel disk rubber tire				R				R	
Rew. idler rubber tire				R				R	
Drum brush assembly		C		C/R		C		C/R	C
Capstan brush assembly		C		C/R		C		C/R	C
Tension band assembly				R				R	
Supply loading tension brake assembly									
Tape guide	C	C	C	C	C	C	C	C	C
Capstan DC motor				R				R	
Drum DC motor				R				R	

key to abbreviations :
C : Cleaning
L : Lubrication
R : Replacement

Table 5-1 Maintenance schedule (normal operating conditions)

5.4 REPLACEMENTS AND ADJUSTMENTS

5.4.1 Servicing jigs and tools

The following jigs and tools are essential for mechanical adjustment. Without them, a long trial-and-error period would be necessary.

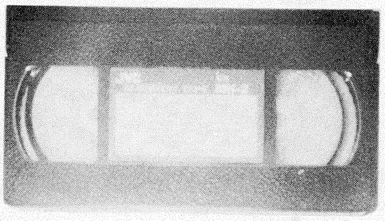
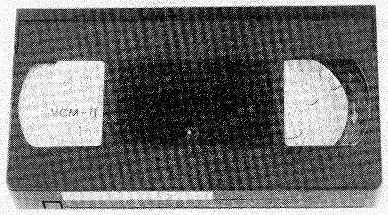
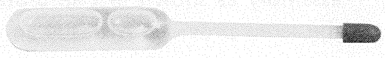
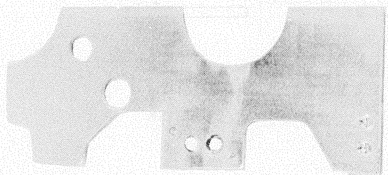
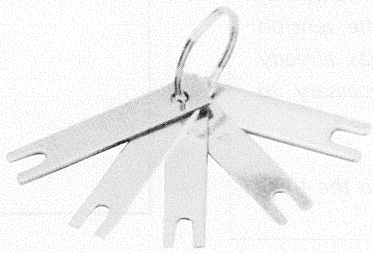
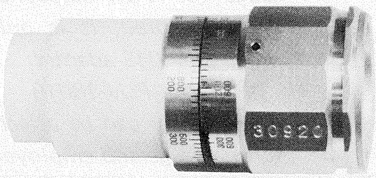
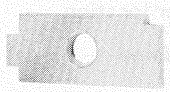
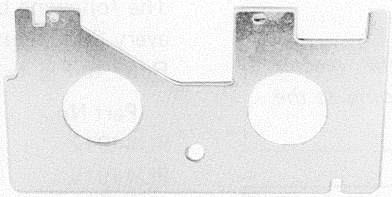
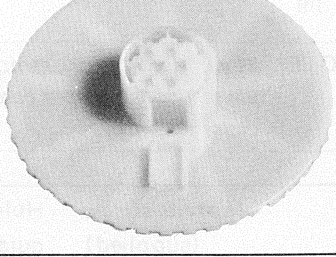
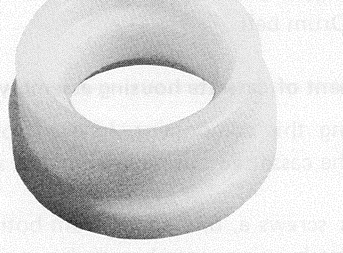
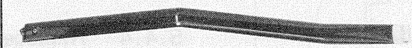
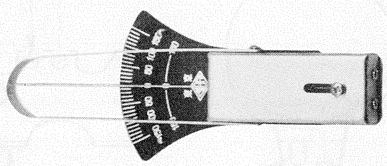
JVC Alignment Tape MH-2 	Back Tension Adjustment Jig PUJ48076 	JVC Oil PU41761 
Master Plane Jig PUJ35730 	Thickness Gauge PUJ48017 	* Torque Gauge PUJ48075 (600 gcm torque meter and VHS adapter) 
Reel Disk Height Jig PUJ48014 	Cassette Housing Setting Jig PUS35881-2 	Tension Check Dummy Reel PU48073 
Master Plane Position Jig PUJ48015 	Cassette Holder PUJ35731 	Tension Gauge PUJ48074 

Fig. 5-2

In addition, general-purpose tools and metric hex keys (not supplied by JVC) are required.

> **NOTE:** *Cassette Housing Jig is not included in original VHS Jig Kit (RAK-3300).*

5.4.2 Master plane jig setting

1. Set machine to stop mode.
2. Remove the cassette housing.
3. Remove the shield cap as shown in Fig. 5-3(a).
4. Set the master plane jig on the base of the drum assembly as shown in Fig. 5-3(a), then fasten with the screw provided with the jig.

> **NOTE:** *This is a special metric-thread screw. DO NOT use a non-metric thread screw.*

> **NOTE:** *The tension gauge consists of torque gauge and mounting adapter sections. Since the torque gauge is the same as that employed for all models, if the tension gauge for VCR adjustment has already been procured, it is only necessary to order the VHS adapter:*
> *Part No. PUJ-48016*
> *This adapter can be attached to the VCR torque gauge and employed.*

5. To check tension pole position, first set the master plane positioning jig on the supply reel disk as shown in Fig. 5-3(b), then install the master plane jig.

> **NOTE:** *When setting or removing the master plane jig, use ample care regarding to the drum assembly.*

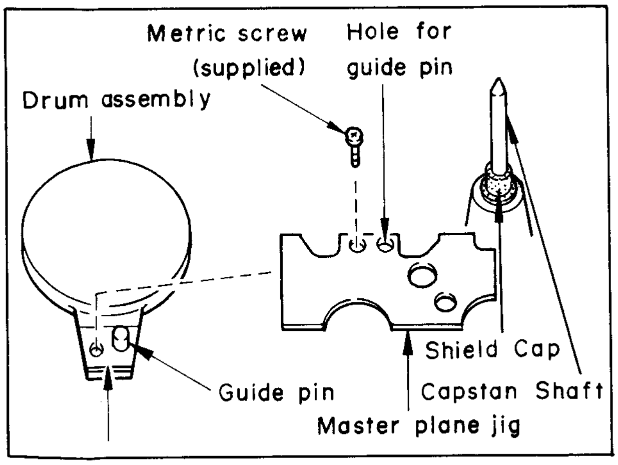

Metric screw (supplied)
Hole for guide pin
Drum assembly
Shield Cap
Guide pin
Capstan Shaft
Master plane jig

Fig. 5-3(a)

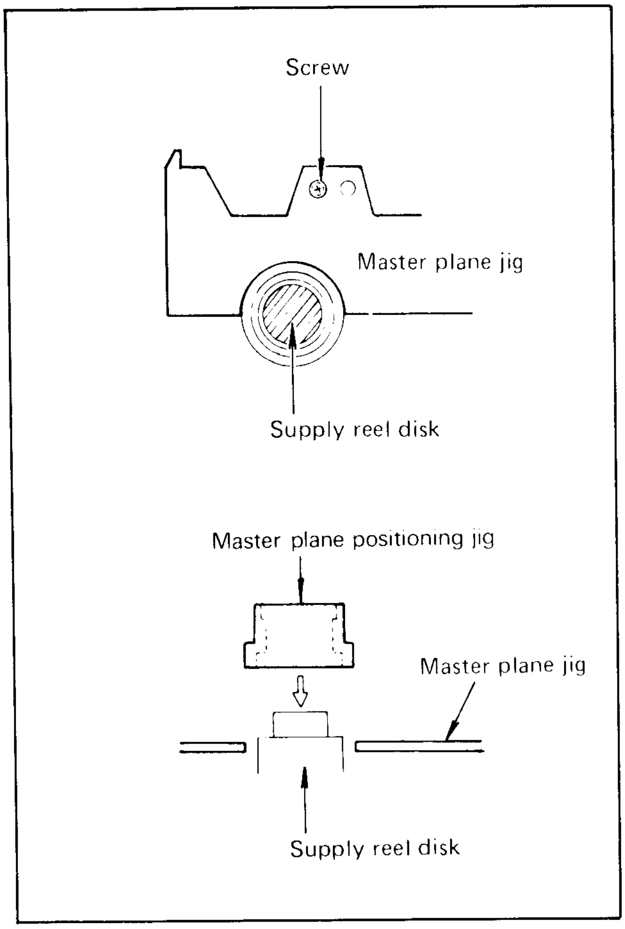

Screw
Master plane jig
Supply reel disk
Master plane positioning jig
Master plane jig
Supply reel disk

Fig. 5-3(b)

5.4.3 Replacement of rubber parts

The following belts should be checked for signs of wear every 2000 hours.
Refer to Fig. 5-1(a) and (b) for location.

Part No.	Part Name
PU44912	Relay belt
PU44918	Take-up reel disk rubber tire
PU44863-2	Counter belt-2
PU44863	Counter belt-1
PU44918-2	Rewind idler rubber tire
PU44912-3	Unloading belt
PU44911	Reel drive belt
PU44912-2	Capstan belt
PU44912-5	Drum belt

5.4.4 Replacement of cassette housing assembly

Avoid disassembling this component. In event of malfunction, replace the cassette housing assembly as a unit.

Removal:

1. Remove four screws a, b, c and d from both sides of the cassette housing assembly as shown in Fig. 5-4.

2. Draw out the cassette housing by lifting it straight up.

> **NOTE:** *To operate the unit without the cassette housing, press the cassette switch (S12) by hand. Also, cover the phototransistor sensors.*

Replacement:

1. Remove the four cassette cover screws from the cassette housing and take off the cassette cover.
2. Before installing, check angles of stoppers A and B of the cassette housing as shown in Fig. 5-5.
   If necessary, adjust by bending them.
3. Install the cassette housing and observe that the lock lever is positioned between the eject plate and the function assembly as shown in Fig. 5-4. If the lock lever is not in correct position, the EJECT key will not operate. And also, check that the spring plate touches to the junction assembly.
4. Fasten the four screws a, b, c and d temporarily. Refer to Fig. 5-6.
5. Insert the cassette housing setting jig slowly into the cassette housing and depress the cassette housing downward to lock-in.
   At this time, check that the jig is loaded correctly in the manner of a cassette tape.
6. Slide the cassette housing fully rearward so that stoppers become positioned as shown in Fig. 5-6 and clearance is absent between the stoppers and tips of the setting jig.
7. In this condition, secure the four screws in order of a, b, c and d. Again, verify that clearance between the stoppers and tips of the jig is zero.
8. Depress the EJECT key and remove the jig from the cassette housing.
9. Install the cassette cover on the cassette housing and check as follows.
10. Insert a new spare cassette tape (E-180) into the cassette housing and slowly depress the cassette housing downward to lock-in.

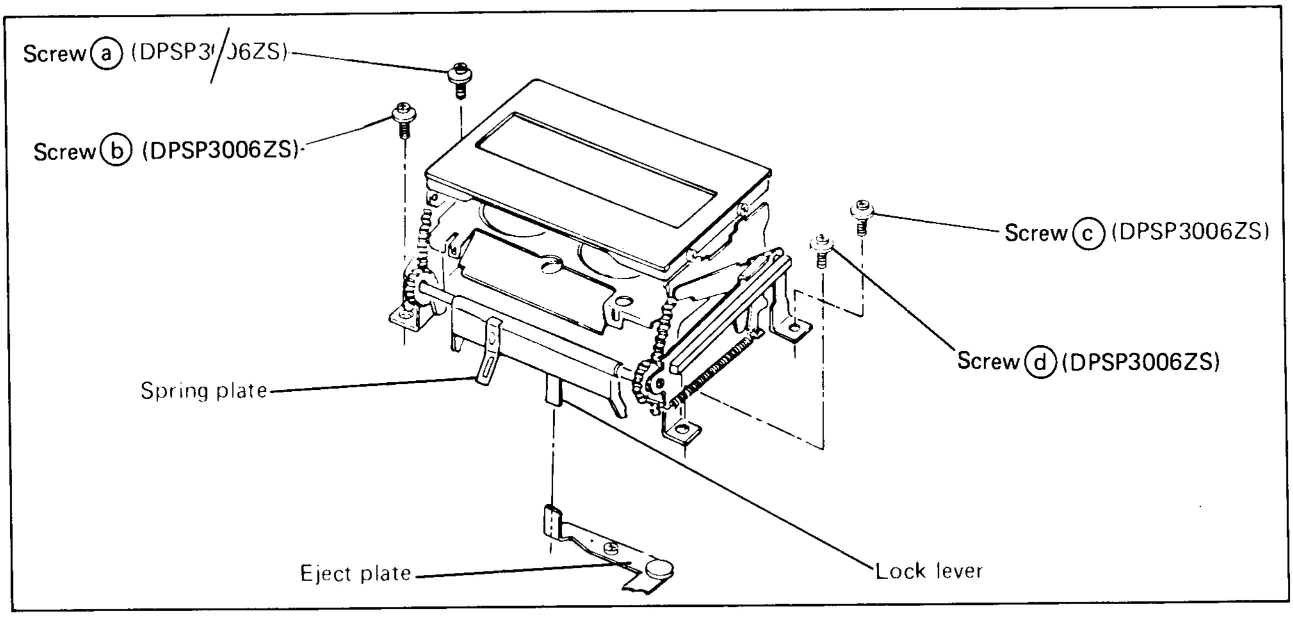


Fig. 5-4 Replacement of cassette housing

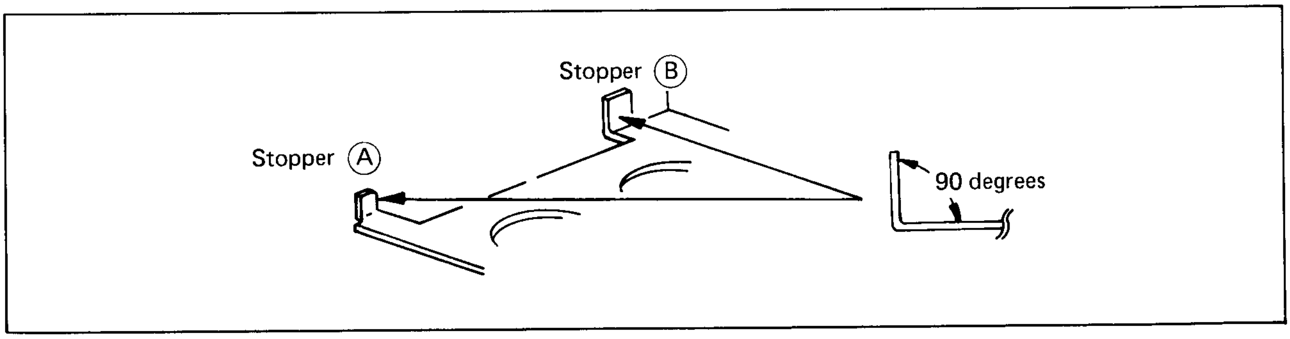
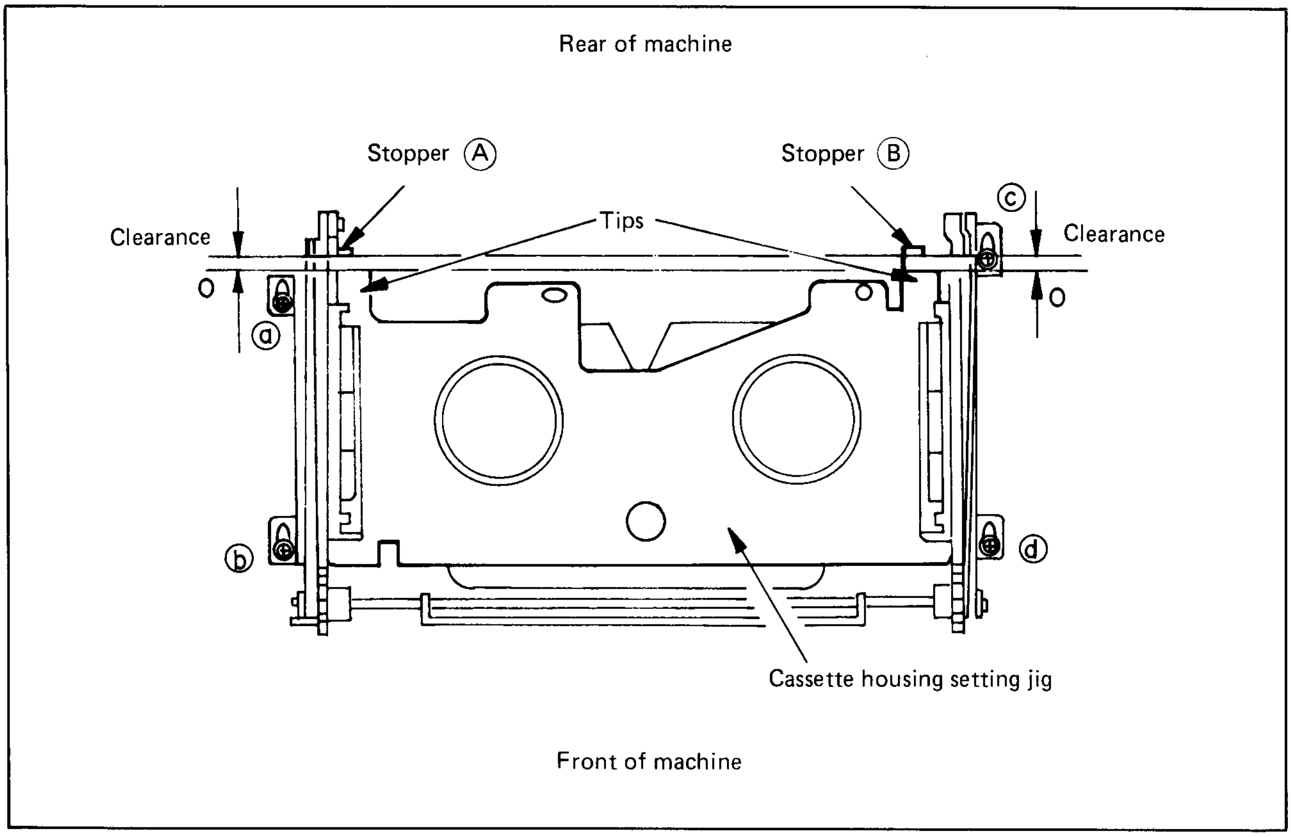


Fig. 5-5



Verify that both right and left sides of the cassette housing lock simultaneously and smoothly. Depress the EJECT key, and confirm that the housing becomes raised smartly.

11. With cassette housing locked, check that cassette tape can be moved back and forth with the fingers.
12. Set machine to Rewind (or Fast Forward) mode and verify that the tape is wound smoothly.
13. Set machine to Play mode and observe the tape traveling. Confirm absence of folding or wrinkling as the tape enters and leaves the cassette.

5.4.5 Replacement of reel disk

Removal:

1. Remove the cassette housing as described in section 5.4.4.
2. Remove the E-ring 1 from the end of the reel disk shaft as shown in Fig. 5-7.
3. Remove the E-ring on the top of the supply tension arm shaft, then remove the tension band.

NOTE: *When taking off the brake band, be careful to avoid bending it. If deformed, the brake band will have to be replaced.*

4. Then take off the reel disk by pulling gently upward.

NOTE: *The metal washers (2) at the bottom of the reel disk may come off with the reel disk. Be careful not to misplace them.*

5. After installing the new reel disk perform the following adjustment.

Height adjustment:

1. Set the master plane jig (refer to section 5.4.2).
2. After the master plane jig is set in place, check the reel disk height by using the height adjustment jig.
3. Place the height adjustment jig on the master plane jig, check that the reel disk height is lower than area "A" and higher than area "B" as shown in Fig. 5-8.
4. To adjust the height, add or remove one or more of the different thickness washers listed in Fig. 5-8.
5. After the height adjustment, use washer(s) to adjust for clearance of 0.1–0.2 mm between the E-ring and top of the reel disk.
6. Lubricate the reel disk shaft. When the supply reel disk is replaced, check the back tension according to section 5.4.12.

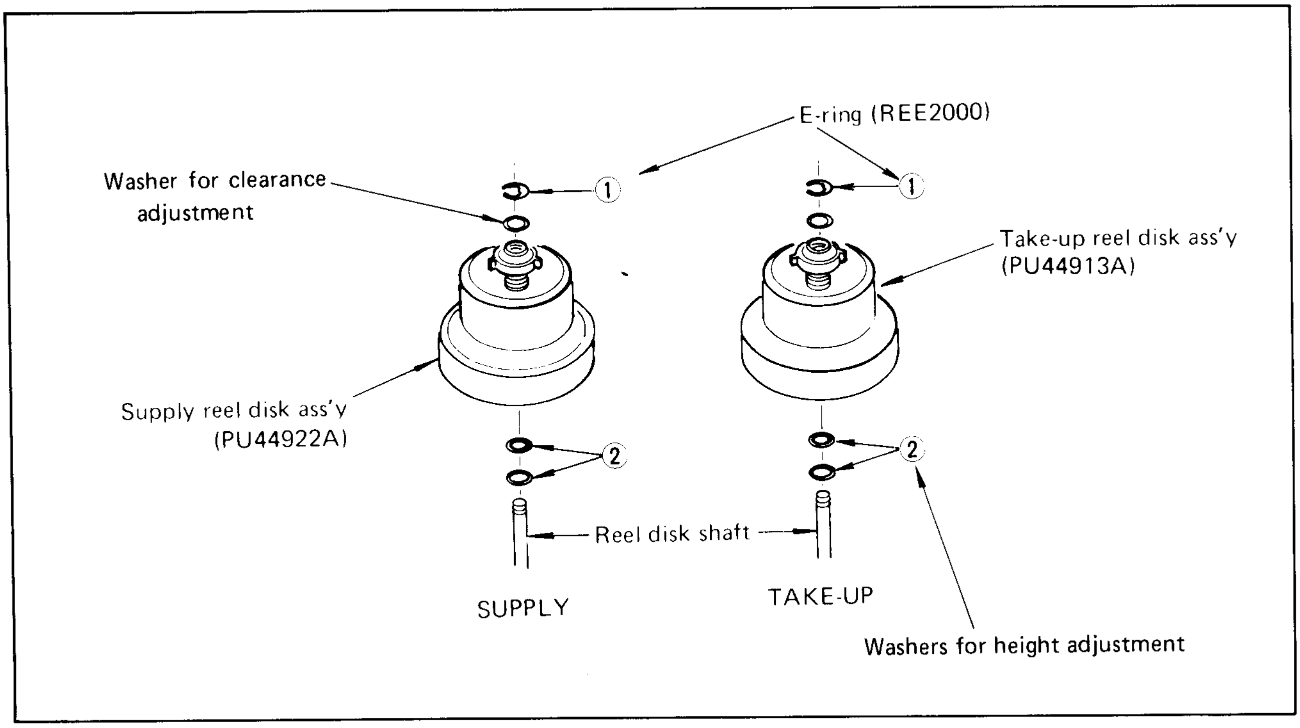
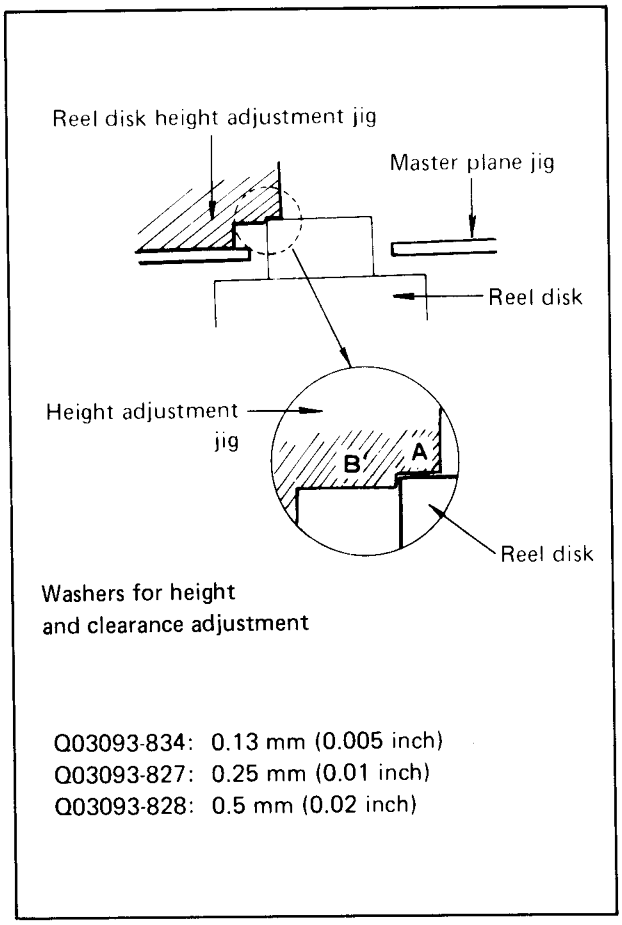

E-ring (REE2000)
Washer for clearance adjustment
①
①
Take-up reel disk ass'y (PU44913A)
Supply reel disk ass'y (PU44922A)
②
②
Reel disk shaft
SUPPLY
TAKE-UP
Washers for height adjustment

Fig. 5-7 Replacement of reel disk


Reel disk height adjustment jig
Master plane jig
Reel disk
Height adjustment jig
B
A
Reel disk
Washers for height and clearance adjustment

Q03093-834: 0.13 mm (0.005 inch)
Q03093-827: 0.25 mm (0.01 inch)
Q03093-828: 0.5 mm (0.02 inch)

Fig. 5-8 Reel disk height adjustment

5.4.6 Adjustment of the supply loading back tension

1. Remove the cassette housing assembly.
2. Set the unit to Play mode without installing a cassette.
3. Hold the PLAY key depressed and before loading arm reaches the end of movement turn off the power, so that the PLAY key becomes locked by the function mechanism.
4. Set the tension check reel on the supply reel disk.
5. Measure the supply loading tension by pulling the video tape and reading tension gauge as shown in Fig. 5-9.

   The measured loading tension should be between 40 and 50 grams.

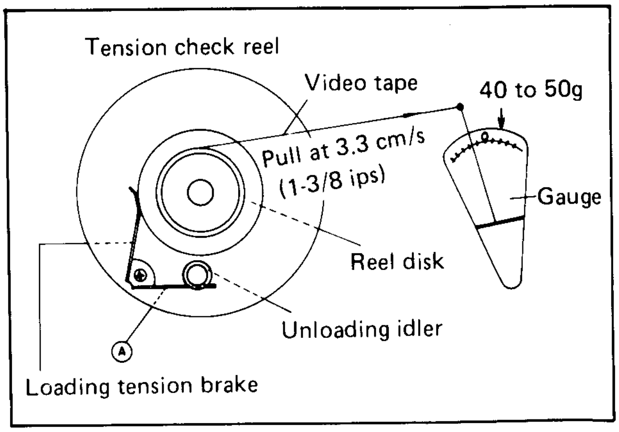

Tension check reel
Video tape
40 to 50g
Pull at 3.3 cm/s (1-3/8 ips)
Gauge
Reel disk
Unloading idler
Ⓐ
Loading tension brake

Fig. 5-9

6. If tne measured supply loading back tension is greater than 50 grams, slightly and carefully bend the supply loading idler lever at point A as shown in Fig. 5-10(a).
7. If the measured supply loading tension is less than 40 grams, bend the supply loading lever at point A as shown in Fig. 5-10(b).
8. After adjustment, again measure the supply loading tension.
   Check for correct tape transport during loading and unloading, and that tape travels smoothly with no evident wrinkles near the beginning of the cassette tape (E-180).

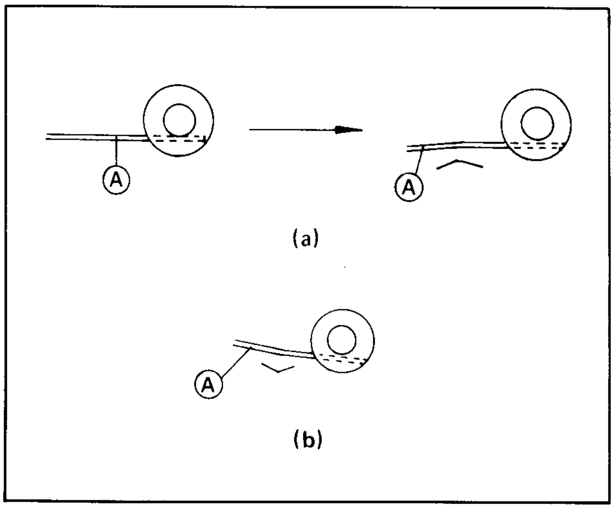


Fig. 5-10

5.4.7 Adjustment of take-up loading brake

1. Remove the cassette housing assembly.
2. Set the unit to Play mode.
3. Hold the PLAY key depressed and before the loading arm reaches the end of movement turn off power so that the PLAY key becomes locked by the function mechanism.
4. Set the tension check reel on the take-up reel disk.
5. Measure the take-up loading tension by pulling the video tape and reading tension gauge as shown in Fig. 5-11. The measured loading tension should be between 30 and 40 grams.
6. If measured take-up loading tension is greater than 40 grams, slightly and carefully bend the take-up loading brake lever at point A as shown in Fig. 5-12(a).
7. If measured take-up loading tension is less than 30 grams, slightly bend the take-up loading brake lever at point A as shown in Fig. 5-12(b).
8. After adjustment, again measure the take-up loading tension and check for correct tape transport during loading and unloading near the end of the cassette tape (E-180).

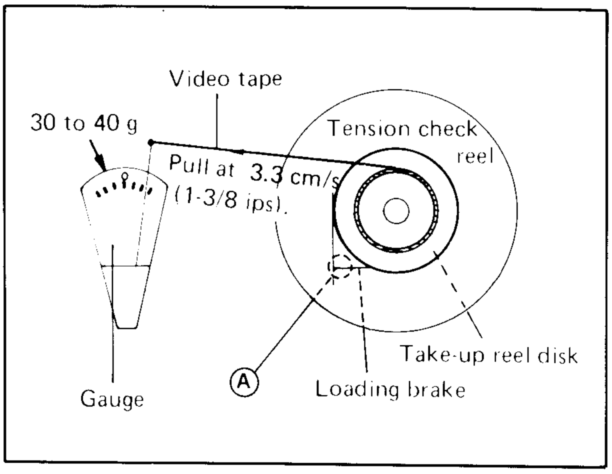


Fig. 5-11

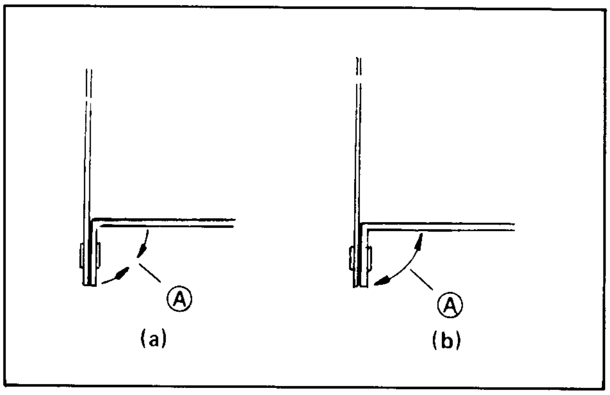


Fig. 5-12

5.4.8 Checking rewind torque

1. Remove the cassette housing assembly.
2. Set the unit to Rewind mode without cassette tape. Before measurement, clean the following drive systems (refer to section 5.2.1).
   - Reel drive belt
   - Rubber tire of rewind idler
   - Rewind idler
   - Supply reel disk.
3. Check the rewind torque by attaching the torque meter to supply reel disk.
4. Gradually relax your grip on the torque meter, and read the meter as it is slowly slipping in your hand.
5. A proper rewind torque is more than 270 grams.
6. If the rewind torque is less than 270 grams, check the wear of reel drive belt and rubber part of rewind idler assembly.
7. If the rewind torque is excessively different, replace the rewind idler assembly according to the following steps.
8. Remove the rubber tire of rewind idler assembly from top of the unit.
9. Remove the E-ring from the shaft.

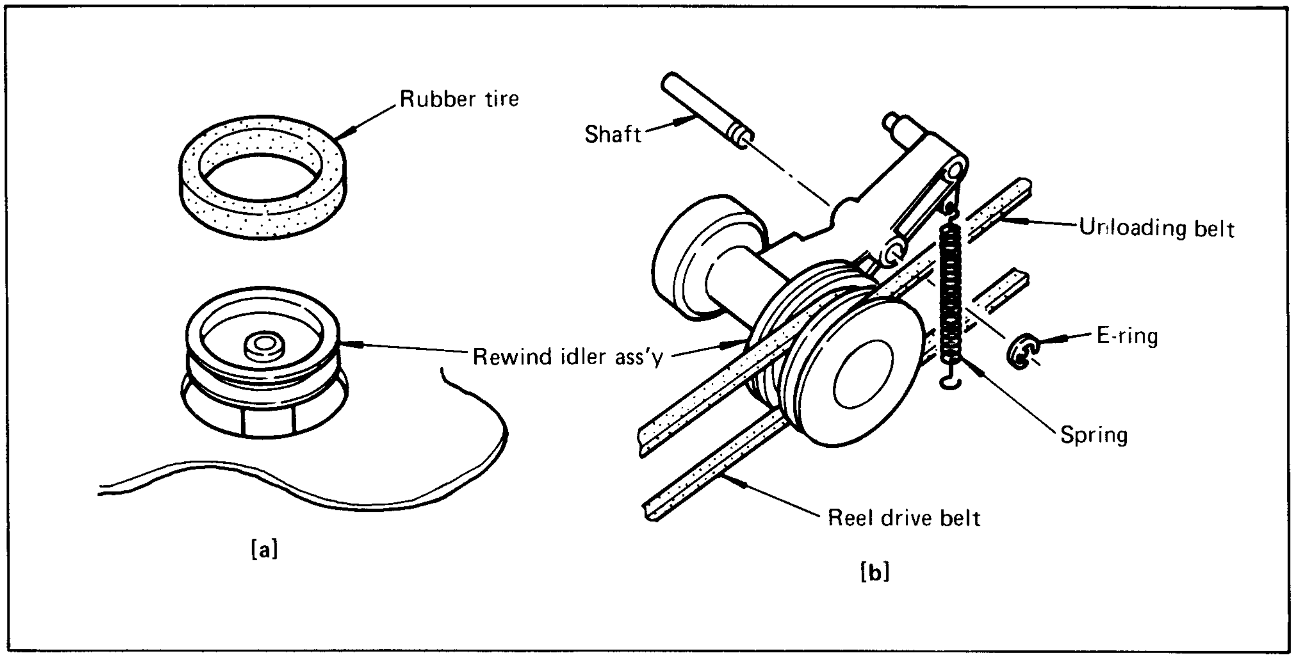

Rubber tire
Shaft
Unloading belt
Rewind idler ass'y
E-ring
Spring
Reel drive belt
[a]
[b]

Fig. 5-13

10. Remove the rewind idler assembly.
11. After the new rewind idler assembly is set in place, again measure the rewind torque.

5.4.9 Checking F. F. (fast forward) torque

1. Remove the cassette housing assembly.
2. Set the unit to F. F. mode without cassette tape.
3. Check the F. F. torque by attaching the torque meter to take-up reel disk.
4. Gradually relax your grip on the torque meter and read the meter as it is slowly slipping in your hand.
   A proper F. F. torque is more than 270 grams.
5. If the F. F. torque is less than 270 grams, clean the following drive system.
   - Rubber tire of rewind idler
   - Rubber tire of rewind idler
   - Rubber tire of take-up reel disk
   - F. F. idler

5.4.10 Adjustment of take-up torque

1. Remove the cassette housing assembly.
2. Set the unit to Record mode without cassette tape.
3. Before measurement, keep the unit in Record mode for about two minutes. Set the unit to Pause mode, then apply the torque meter to the take-up reel disk and press the memory plate gently by hand.
4. Gradually relax your grip on the torque meter and read the meter while it is slowly slipping in your hand.
5. Clean the following drive system (refer to section 5.2.1).
   - Reel drive belt
   - Take-up idler
   - Take-up reel disk.
6. If the take-up torque is less than proper, adjust the position of the take-up idler assembly spring in the direction of arrow (a) as shown in Fig. 5-14. then again measure the take-up torque.
7. If the take-up torque is greater than proper, change the spring position toward arrow (b) direction as shown in Fig. 5-14, then again measure the take-up torque.

NOTE: *Do not set the spring to position (G).*

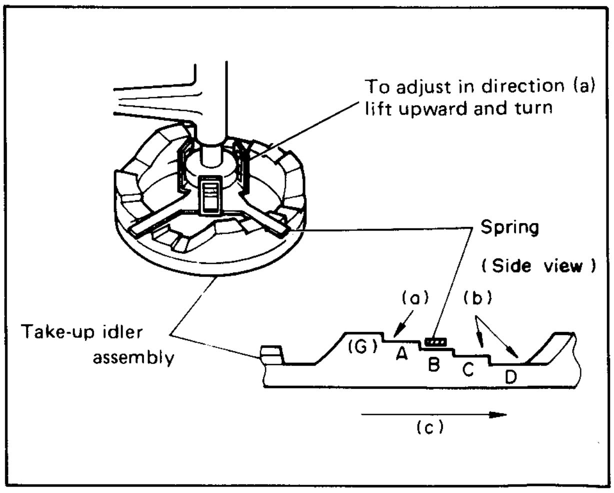

To adjust in direction (a) lift upward and turn
Spring
(Side view)
(a)
(b)
Take-up idler assembly
(G)
A
B
C
D
(c)

Fig. 5-14 Take-up idler assembly

5.4.11 Adjustment of unloading torque

1. Remove the cassette housing assembly.
2. Before measurement, clean the following drive system (refer to section 5.2.1).
   - Reel drive belt
   - Rewind pulley
   - Unloading pulley
   - Rubber tire of unloading idler
   - Supply reel disk
3. Set the torque meter to the supply reel sisk. Push the memory plate in direction of arrow (A) as shown in Fig. 5-16. Gradually relax your grip on the torque meter and read the meter while it is slowly slipping in your hand.
4. A proper torque is between 80 and 220 grams.
5. If the unloading torque is much less than 80 grams, check the wear of reel drive belt and rubber tire of unloading idler. Replace it if necessary.
6. If the unloading torque is still incorrect, replace the unloading idler assembly.
7. Remove the E-ring and spring as shown in Fig. 5-17.
8. Take off the unloading idler assembly.
   After the new unloading idler assembly is set in place, again measure the unloading torque.

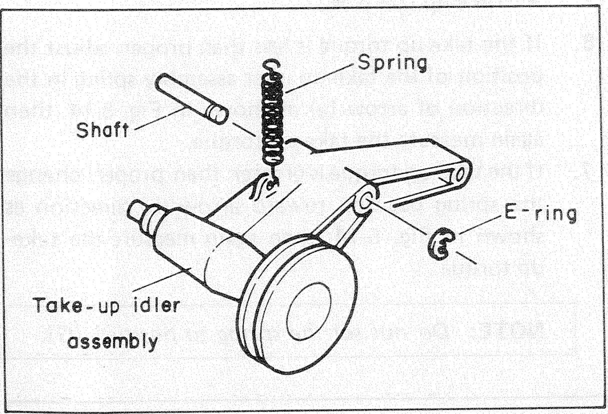


Fig. 5-15 Take-up idler assembly

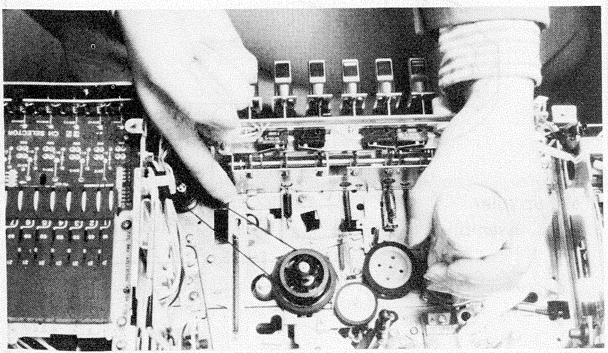


Fig. 5-16

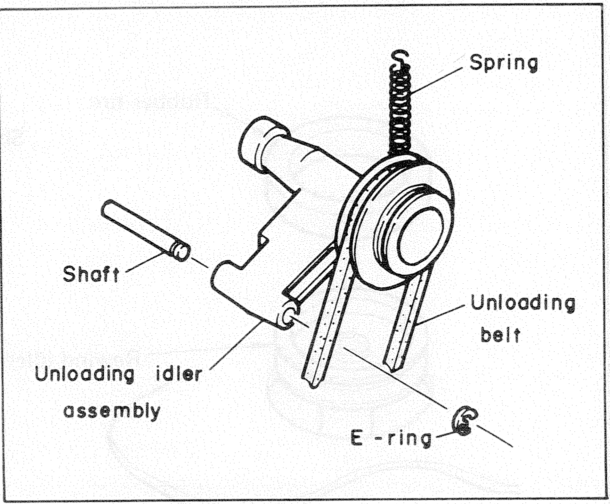


Fig. 5-17 Unloading idler assembly

5.4.12 Back tension adjustment

Tension band replacement.

1. Remove the cassette housing assembly.
2. Remove screws ①, ② and tension band assembly ③ from the chassis as shown in Fig. 5-18 (a).
3. Install the new tension band ass'y and collar ④, then tighten screws ① and ②.

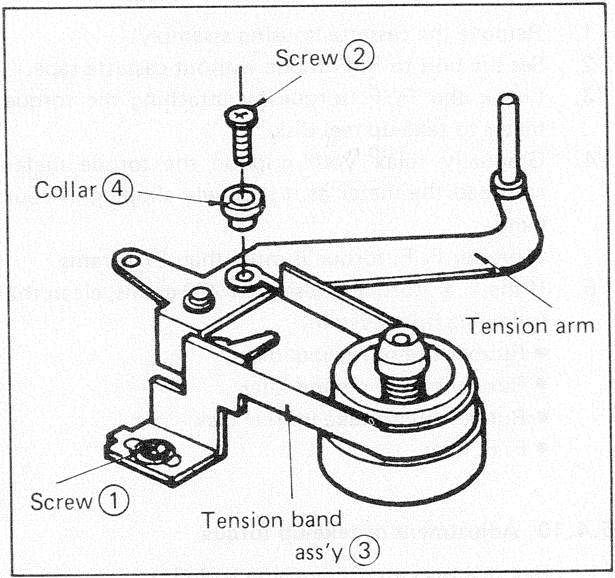


Fig. 5-18(a) Tension band replacement

Adjustment of tension pole position

1. Set the master plane jig (refer to section 5.4.2).
2. Set the unit to Play mode with E-180 cassette tape (end portion of tape).
3. After tape starts traveling, check the tension pole position as shown in Fig. 5-18 (b). Clearance between tension pole and tip of master plane jig is 1.5 mm (0.06 inches).

4. If not, loosen screw ③ and adjust the position of plate ④ as shown in Fig. 5-18 (b).

Back-tension adjustment

1. Set the back-tension adjustment jig to the unit and set to Play mode.
2. Read the adjustment jig meter while it is slowly rotating in the cassette. A proper back tension is 28 to 45 grams.
3. If measured back-tension is greater than 45 grams or less than 28 grams, loosen screw ① and adjust position of plate ② so that the back-tension becomes 35 grams; then tighten screw ① (see Fig. 5-19).

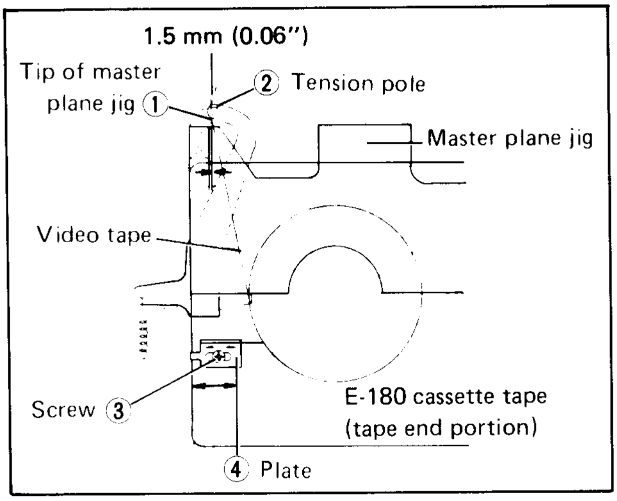

1.5 mm (0.06")
Tip of master plane jig ①
② Tension pole
Master plane jig
Video tape
Screw ③
E-180 cassette tape (tape end portion)
④ Plate

Fig. 5-18(b) Back tension adjustment

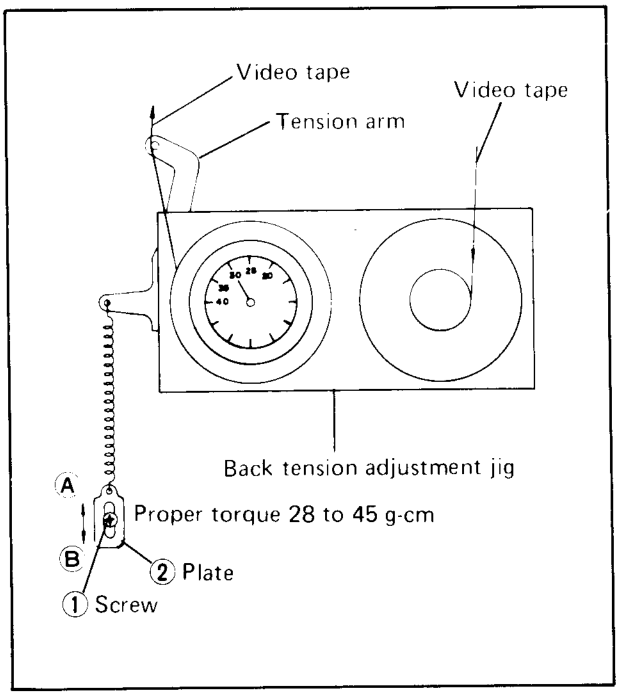

Video tape
Video tape
Tension arm
Back tension adjustment jig
A
B
Proper torque 28 to 45 g-cm
② Plate
① Screw

Fig. 5-19 Back tension adjustment

4. After adjustment, set the unit to Play mode with E-180 cassette tape (beginning portion of tape) and check the position of tension pole. At this time, observe that the tension pole is not touching the bracket of cassette housing.
5. Record and play back a picture. Check for the switching point at 3.5 horizontal lines before the V-blanking signal and absence of skew problems at the switching point.

5.4.13 Replacement of capstan motor

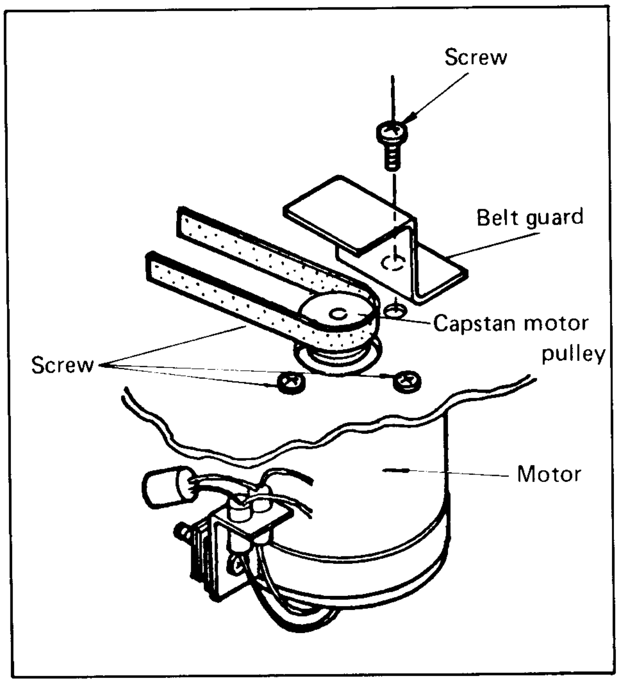

Screw
Belt guard
Capstan motor pulley
Screw
Motor

Fig. 5-20 Capstan motor replacement

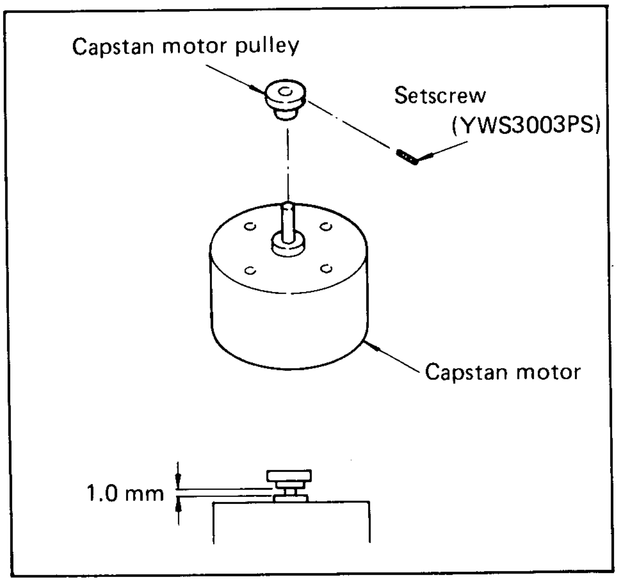

Capstan motor pulley
Setscrew (YWS3003PS)
Capstan motor
1.0 mm

Fig. 5-21

1. Remove the four screws and belt guard fom the chassis as shown in Fig. 5-20.
2. Use a metric hex key to loosen the setscrew and remove the capstan motor pulley (Fig. 5-21).
3. Carefully install pulley on new capstan motor, then mount the motor. Set 1.0 mm thickness gauge between motor and motor pulley, then fasten the setscrew.
4. After replacement, verify the belt runing position. Also perform servo circuit adjustment of section 6.3.

5.4.14 Replacement of drum motor

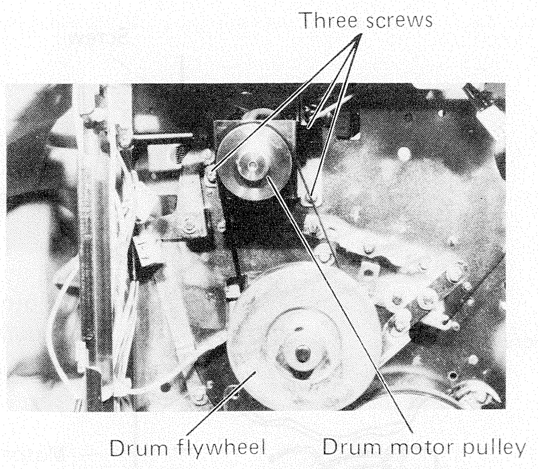

Three screws
Drum flywheel
Drum motor pulley

Fig. 5-22 Replacement of drum motor

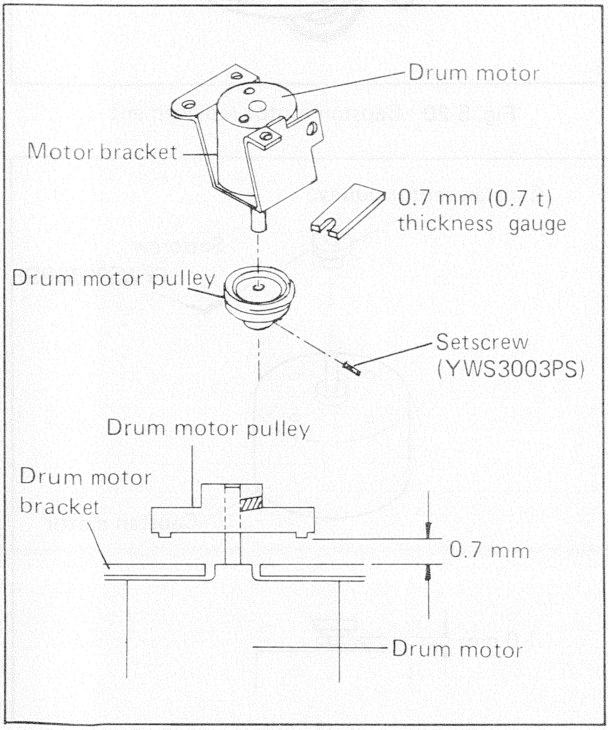

Drum motor
Motor bracket
0.7 mm (0.7 t) thickness gauge
Drum motor pulley
Setscrew (YWS3003PS)
Drum motor pulley
Drum motor bracket
0.7 mm
Drum motor

Fig. 5-23

1. Remove the drum belt.
2. Remove drum motor pulley with a metric hex key, then remove the drum DC motor by loosening three screws.
3. When mounting the motor pulley to the replacement DC motor, set 0.7 mm thickness gauge between motor and motor pulley as shown in Fig. 5-23.
   After replacement, verify the belt running position in Play mode. Also perform adjustment of drum servo circuit. (Refer to section 6.3.)

5.4.15 Replacement of audio/control head assembly

Replacement

1. Remove three screws Ⓐ, Ⓑ, Ⓒ as shown in Fig. 5-24.
2. Unsolder the mini printed board located behind the audio/control head.
3. Solder the mini printed board to the new head assembly.

NOTE: *Do not damage the head surface.*

4. Install the new head assembly in the correct position by using three screws Ⓐ, Ⓑ, Ⓒ as shown in Fig. 5-24.

Adjustment

1. Before adjustment, observe the tape travel at guide roller, take-up impedance roller, guide pole, capstan shaft with a spare cassette tape. Check that the tape travels smoothly with no wrinkles.

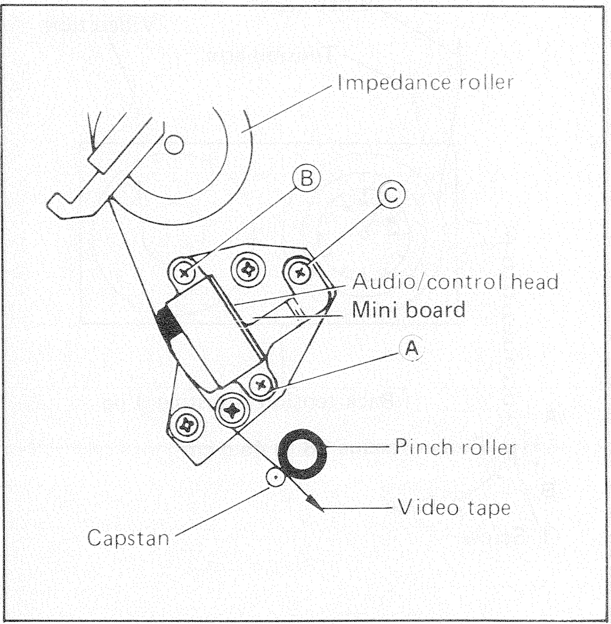

Impedance roller
B
C
Audio/control head
Mini board
A
Pinch roller
Video tape
Capstan

Fig. 5-24

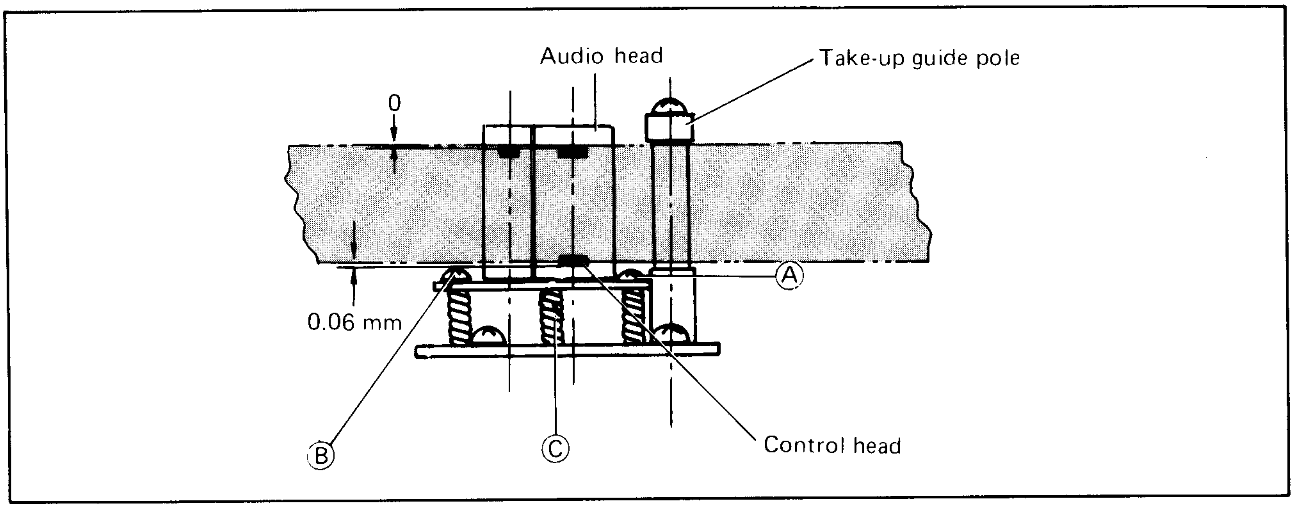


Fig. 5-25

2. If an unsatisfactory condition is noted by the above check, adjust the three screws Ⓐ, Ⓑ and Ⓒ by turning in small increments. Do not adjust the guide poles. The normal tape travel is shown in Fig. 5-25.
3. Connect oscilloscope to TP-19 of the Audio and and Servo circuit board.
4. After normal tape traveling is obtained, playback the 7 kHz signal of the JVC alignment tape.

> **NOTE:** *Confirm smooth tape travel before using the JVC alignment tape. Otherwise, it may be damaged.*

5. Adjust screws Ⓐ, Ⓑ and Ⓒ for maximum playback signal at TP-19.
6. After adjustment, verify the head height as shown in Fig. 5-25. Also, check for smooth tape travel.
7. Perform electrical adjustment as described in section 6.6.
8. Record and play back a video signal and confirm normal playback picture. Also check playback with monoscope segment of JVC alignment tape. Finally, set the tracking control to Auto and check for maximum FM output level at TP-7 of the Pre-Rec amplifier board.

5.4.16 Replacement of video head assembly

1. Unsolder yellow wires ①, then unsolder the brown ② and red wires ③.
2. Remove the two screws ④, then pull-up the upper drum assembly.
3. Install the new head assembly and solder the wires as shown in Fig. 5-26.
4. Fasten two screws ④.
5. After replacement, adjust as follows.

(1) Playback switching point (section 6.3.12).
(2) Recording switching point (section 6.3.13).
(3) Tracking (section 6.3.14, 6.3.15).
(4) Video head Q (Quality factor) and resonance (section 6.4.1).
(5) Playback FM channel balance (section 6.4.2).
(6) Playback colour channel balance and colour level (section 6.5.4, 6.5.5).
(7) Recording colour channel balance and colour level (section 6.5.10).
(8) Check of D.O.C. (Dropout compensator) level (section 6.4.3).

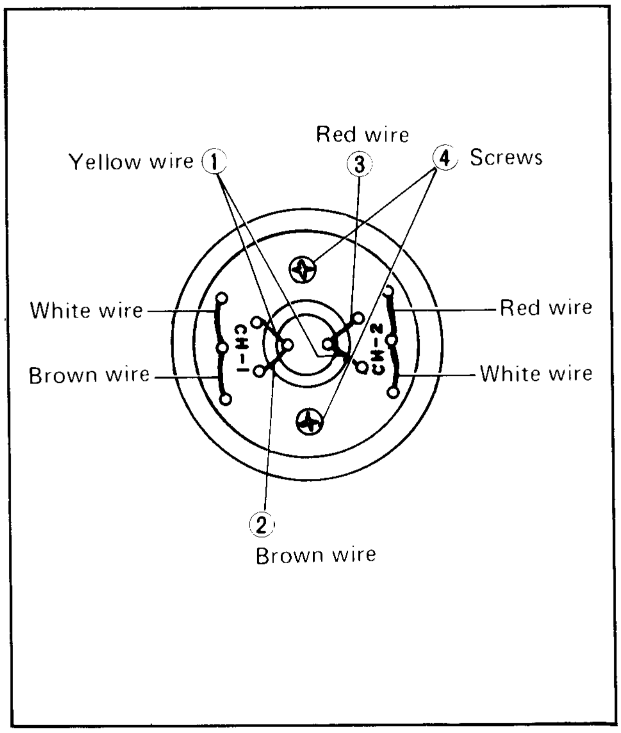


Fig. 5-26 Replacement of video head assembly

5.4.17 Pinch roller replacement

1. Remove screw Ⓐ and pinch roller assembly.
2. Carefully install a new roller assembly (refer to Fig. 5-27).

NOTE: *If the pinch roller assembly is installed in the inverted position, rotation will not be smooth.*

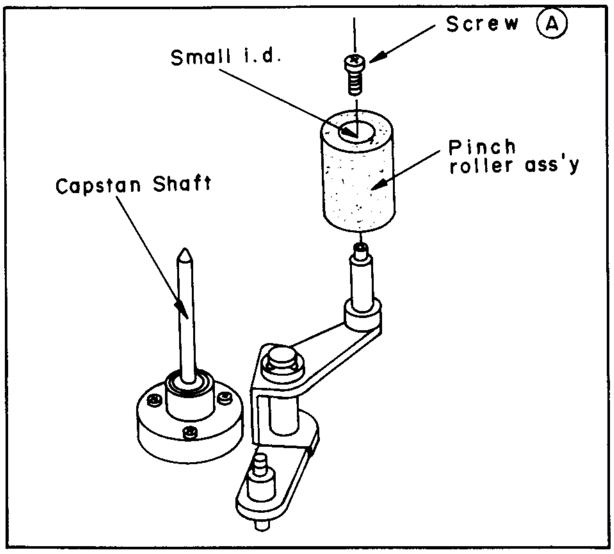

Screw Ⓐ
Small i.d.
Pinch roller ass'y
Capstan Shaft

Fig. 5-27

5.4.18 Check of Pause solenoid operation

1. Set the unit to Play mode without video cassette.
2. Refer to Fig. 5-28. Loosen two screws Ⓐ and adjust front to rear position of pause solenoid so that leading edges of plate A and plate B are aligned.

   In Pause mode, brake shall be applied to take up and supply reel disks, i.e.: brake shall function when Pause solenoid is deenergized.

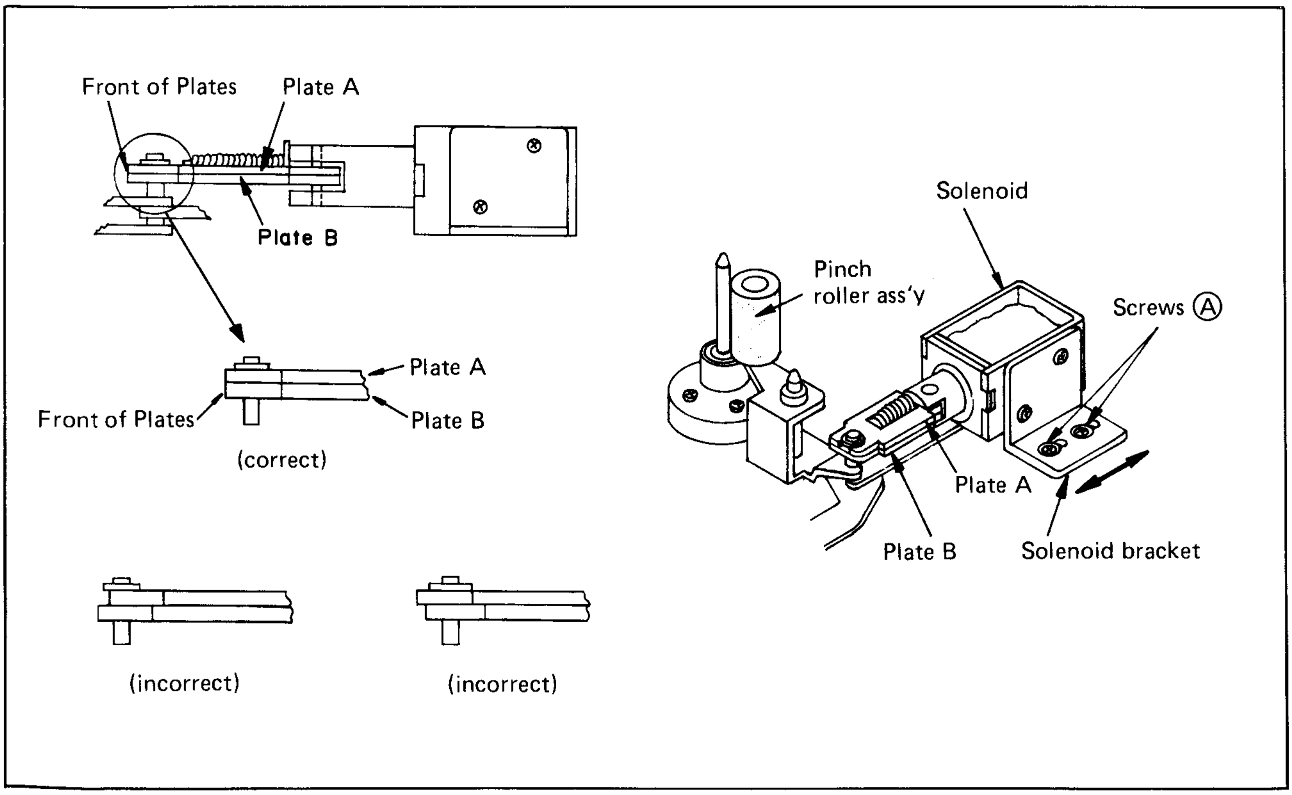

Front of Plates
Plate A
Plate B
Plate A
Front of Plates
Plate B
(correct)
(incorrect)
(incorrect)
Solenoid
Pinch roller ass'y
Screws Ⓐ
Plate A
Plate B
Solenoid bracket

Fig. 5-28

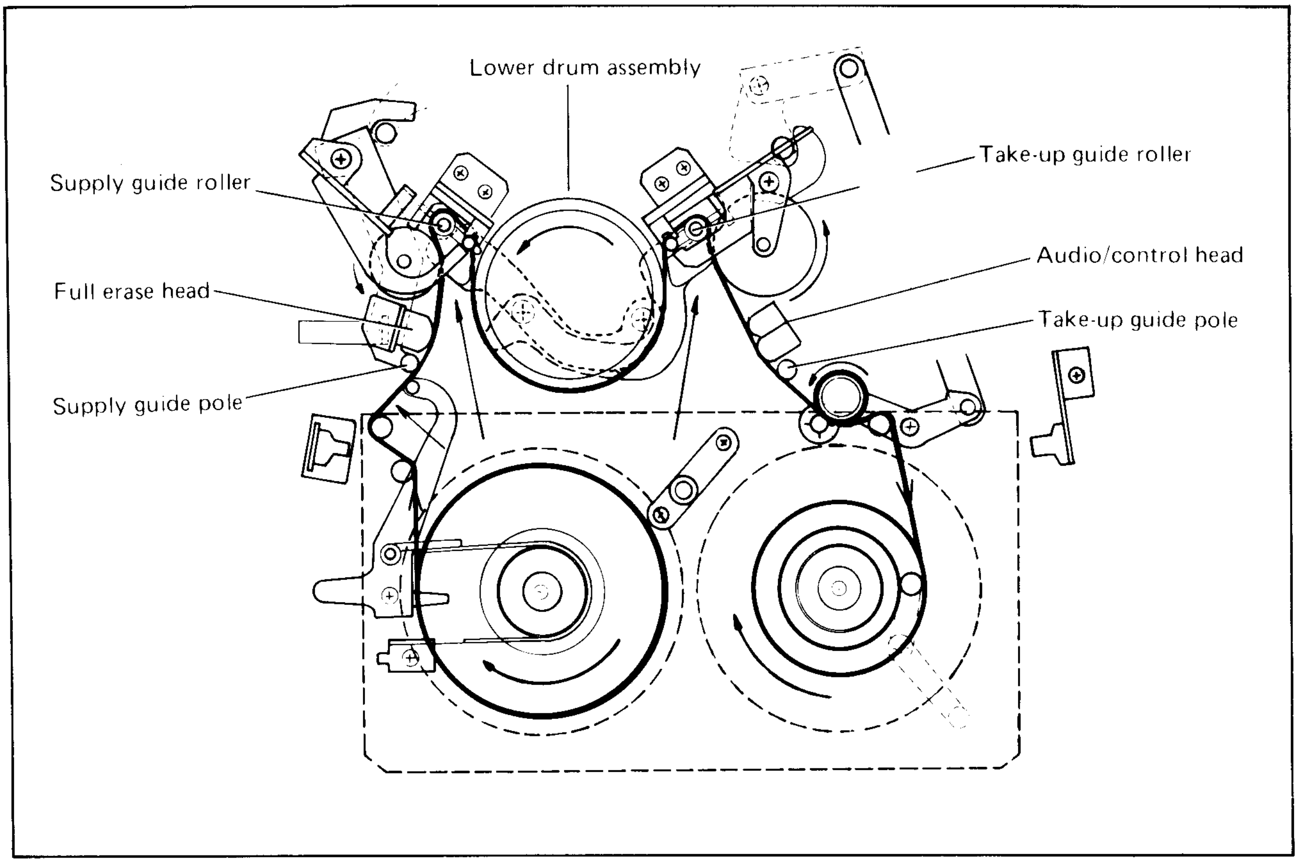

Lower drum assembly
Supply guide roller
Full erase head
Supply guide pole
Take-up guide roller
Audio/control head
Take-up guide pole

Fig. 5-29 Tape path

5.4.19 Tape transport system checking

It is very important that in Play mode, the tape travels in a smooth, uncreased path from the tape outlet to the tape inlet of the video cassette. The tape transport is very carefully factory-adjusted. When a part associated with this section (such as the supply back-tension pole, audio/control head assembly, pinch roller assembly, etc.) has been replaced, the tape transport must be checked as described in this manual. It is important to remedy faulty tape travel by adjusting those parts directly involved in the replacement. If this is neglected or other parts (guide pole, etc.) are adjusted, proper tape transport can not be obtained.

Check the tape path according to the following steps.

Important: Do not disturb the two guide poles.

Tension pole

1. Set the unit to Play mode with cassette tape installed.
2. While tape is traveling, check for absence of wrinkling at the outlet of the cassette tape and the supply back tension pole as shown in Fig. 5-30.
3. If tape wrinkling occurs, check the reel disk height (see section 5.4.5).
4. Set the master plane jig (refer to section 5.4.2).
5. Set the unit to Play mode without installing cassette tape.
6. Place the reel disk height adjustment jig on the master plane jig and adjust the tilt of the tension pole as shown in Fig. 5-31.
   After adjustment, again check the tape path.

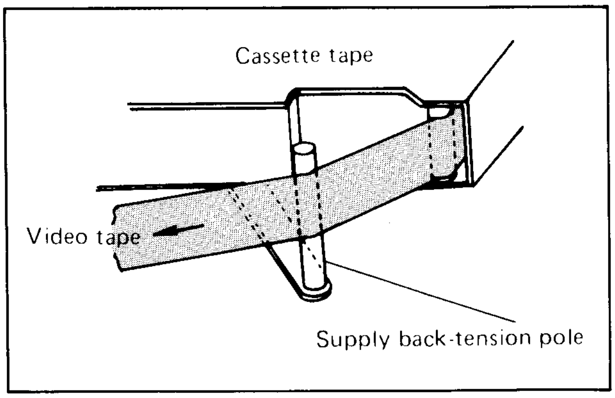

Cassette tape
Video tape
Supply back-tension pole

Fig. 5-30

Supply guide pole, full erase head, guide rollers, take-up guide pole

1. Set the unit to Play mode with cassette tape installed.
2. Observe tape traveling at the supply guide pole, full erase head, guide rollers and take-up guide pole and confirm absence of tape wrinkes (see Fig. 5-32).

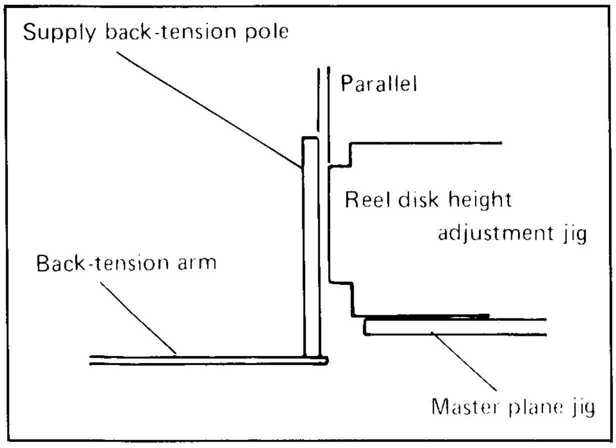

Supply back-tension pole
Parallel
Reel disk height adjustment jig
Back-tension arm
Master plane jig

Fig. 5-31

5.4.20 Function key check

Function key

1. Press the PLAY key; other function keys (except STOP and PAUSE) should not operate.
2. Press the F.F. key; other function keys should not operate (except STOP and PAUSE).
3. Press the REW key; other function keys should not operate (except STOP and PAUSE).
4. After pressing the PAUSE key, FULL REC (full record) and AF REC (after record) keys operate if cassette tape contains safety tab.
5. When the STOP key is pressed during Play mode, other function keys do not operate during unloading (except STOP and PAUSE).

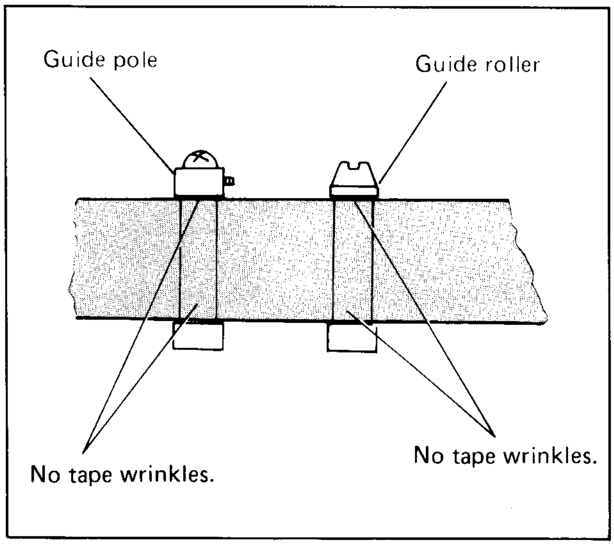

Guide pole
Guide roller
No tape wrinkles.
No tape wrinkles.

Fig. 5-32

Function microswitches

1. PLAY, F.F. and REW keys operate microswitches (S1) and (S16).
2. PLAY key operates microswitch (S2).
3. REW key operates microswitch (S3).
4. PAUSE key operates microswitch (S5).
5. RECORD key operates microswitch (S4).

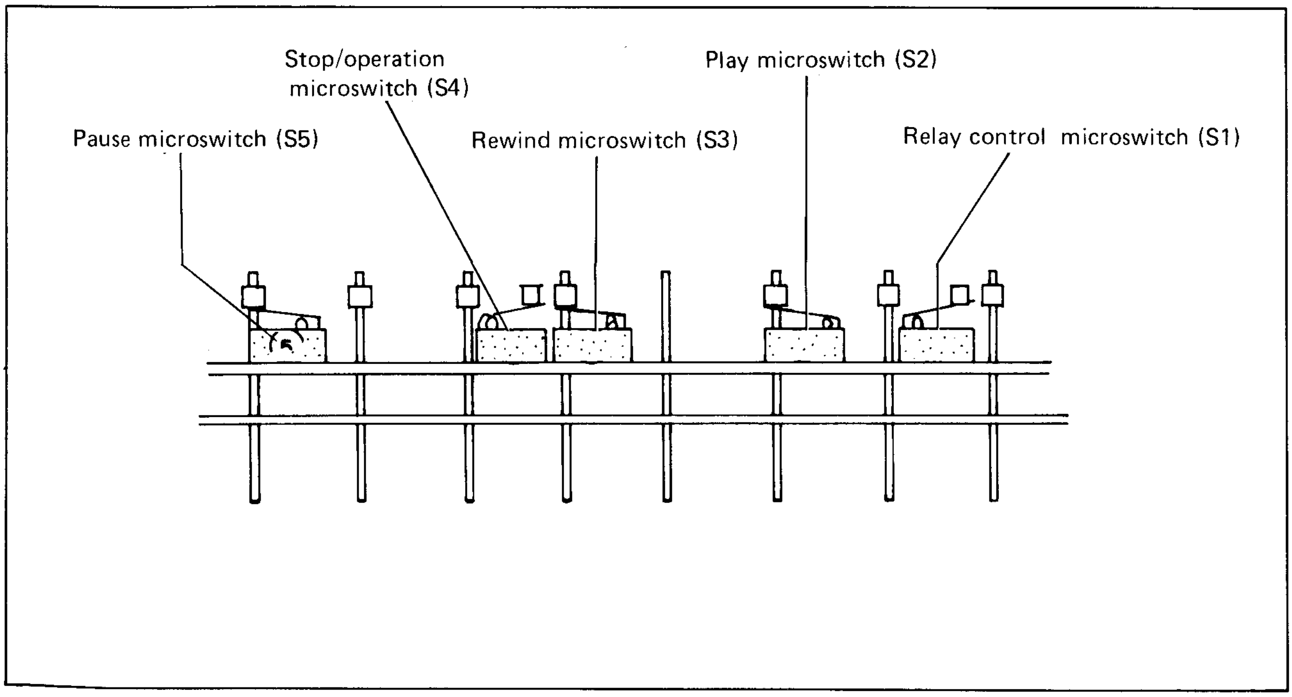

Stop/operation microswitch (S4)
Play microswitch (S2)
Pause microswitch (S5)
Rewind microswitch (S3)
Relay control microswitch (S1)

Fig. 5-33

SECTION 6
ELECTRONIC ADJUSTMENTS

6.1 GENERAL

6.1.1 Introduction

The JVC "VHS" is designed for high reliability. The electrical system has been completely adjusted and carefully inspected before shipment from the factory. For this reason, the following procedure is needed principally when mechanical parts are replaced and re-adjustment of the electronic and signal systems is made necessary by such replacement.

If the electrical system should fail, be sure to check all voltages and waveforms before attempting any adjustments. Note that correct operation is achieved only when all circuits are properly adjusted, and therefore, improper adjustment of a single "block" of circuits may disrupt all functions. The best procedure is to locate the cause of trouble first, then begin repair, replacement or adjustment.

This section describes the electrical adjustments which may become necessary when printed circuit board or major components have been replaced.

An MOS type IC is employed in this "VHS". The MOS IC's are extremely fragile and may be very easily destroyed by improper handling. Always observe the following precautions when servicing this unit.

The MOS IC's are the following:
MSM4011, MSM4023, MSM4066, MSM5816, CD4023-UBE, SC3044, 3SK49Q.

1. These ICs are shipped pinned to a conductive foam plastic base. They must not be separated from this base while in storage. If you are using one of several ICs pinned to a common base, remove it from the others by cutting the base. Keep the base attached to the IC until you are ready to mount it. Do NOT substitute any other material for the base.
2. There are several precautions to be observed when soldering the new IC into the circuit. Always use a low wattage soldering iron with an isolation transformer. The work bench should be covered with a conductive metal sheet with the chassis under repair grounded.
3. If it is impossible to obtain an isolation transformer, the soldering iron tip, chassis and technician must all be at a common potential.
4. When the IC is installed and power applied, the case is at 12 V DC. If the case is shorted to ground, the IC may be damaged.

Equipment required:

Oscilloscope	: Wide-band, Dual-trace
Digital voltmeter	: HEWLETT-PACKARD Model 3476A/B or equivalent
Frequency counter	: HEWLETT-PACKARD Model 5381A or equivalent
Signal generator	: Color bar, Stairstep
Alignment tape	: JVC MH-2

6.2 REGULATOR CIRCUIT

6.2.1 Check of unregulated 18 V DC power supply

1. Connect a DC voltmeter to connector 64 on the Regulator circuit board as shown in Fig. 6-59.
2. Set the unit to Record mode and check that the DC voltage is 18 ± 2 volts.

6.2.2 Adjustment of 12 V DC power supply

1. Connect a DC voltmeter to TP-1 (12 V DC) on the Regulator circuit board as shown in Fig. 6-59.
2. Set the unit to Record mode and adjust R11 (12 V ADJ.) so that the DC voltage of TP-1 is 12 ± 0.1 volts.
3. Then connect the oscilloscope to TP-1, verify the ripple of TP-1 is less than 5 millivolts peak-to-peak.

6.2.3 Check of unregulated 46 V DC power supply

1. Connect a DC voltmeter to connector 81 on the Regulator circuit board as shown in Fig. 6-59.
2. Set the unit to Record mode and check that the DC voltage is 46 ± 0.1 volts.

6.2.4 Check of 7 V AC power supply

1. Connect an AC voltmeter between connector 42 and 43 on the Regulator circuit board, as shown in Fig. 6-59.
2. Check that the AC voltage is within 6–9 volts.

6.3 MECHANISM CONTROL CIRCUIT ADJUSTMENTS

Before proceeding with the following steps, confirm normal operation of Play, Fast Forward, and Rewind, together with Auto-Stop in each of these modes.

6.3.1 Delay time

Confirm 4–7.5 sec interval between the time the take-up reel disk stops and the stop solenoid operates.

Measurement: Without inserting tape (however, cassette holder lowered and cassette switch on) and without stop sensor operation, the time from REW mode setting to STOP should be measured.

6.3.2 Drum flip-flop signal

1. During drum rotation (PLAY, FF or REW) confirm the presence of 10 ± 2 Vp-p flip-flop signal at connector 32 of the Mechanism Control circuit board.

6.3.3 Take-up sensor signal

1. The space between the magnet and Hall IC must be less than 1 mm (0.004").
2. While T.U. reel disk is rotating, a waveform of more than 0.8 Vp-p appears at the TP-TUS of the Junction board.

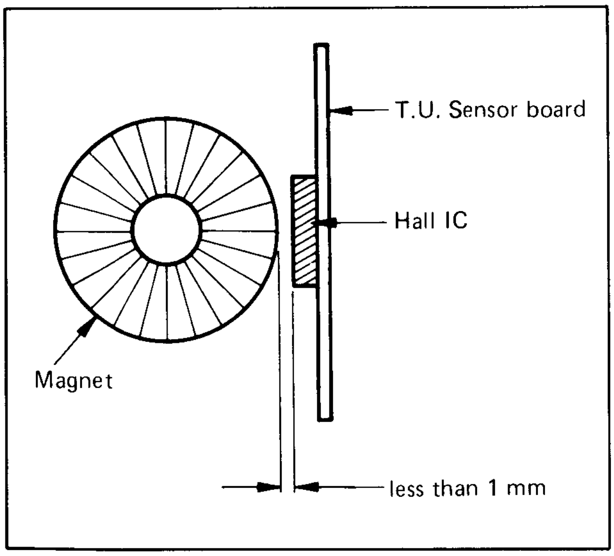


Fig. 6-1 Magnet and Hall IC spacing

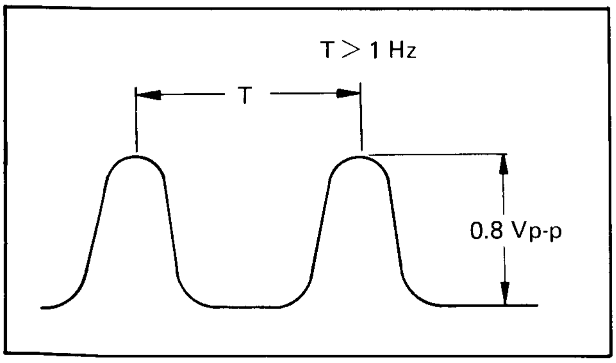


Fig. 6-2 TU sensor output waveform

6.3.4 End sensor and Start sensor

1. During Play, FF, or Rewind, at the transition from video tape to leader tape, the photo transistor operates and Stop mode will be obtained.
2. Measure DC voltage at connectors 21 (ES IN) and 22 (SS IN) of the Mechanism Control circuit board.

   Video tape portion: Less than 1 VDC
   Leader tape portion: More than 10 V DC

6.3.5 Search function

1. During REW mode with SEARCH switch (S10) ON, Stop mode will be obtained when the counter indication changes from 000 to 999.
2. DC voltage at connector 30 (SEARCH) of the Mechanism Control circuit board will change from 0 V to 10 V.

6.4 ADJUSTMENT OF SERVO CIRCUIT

– CAPSTAN SERVO CIRCUIT –

Refer to Fig. 6-62, Audio/Servo Amplifier printed circuit board.

6.4.1 Check of capstan pick-up pulse

1. Connect the oscilloscope to TP-12 (C. PULSE IN) on the Audio/Servo circuit board.
2. Set the unit Record or Playback mode.
3. Check that the capstan pick-up pulse is more than 0.2 volts peak-to-peak.
4. If not, adjust the position of capstan pick-up head.

Note:1. Confirm that the capstan shaft has no thrust clearance. If it has thrust clearance, re-adjust the capstan flywheel so that it has no thrust clearance.

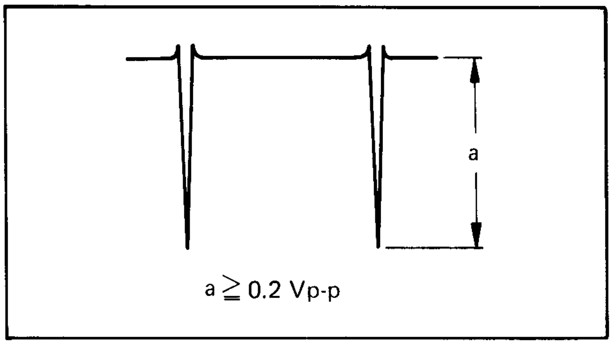


Fig. 6-3 Capstan pick-up pulse

6.4.2 Check of 2.51 crystal oscillator output

1. Connect the oscilloscope to pin 4 of IC4 on the Audio/Servo circuit board.

2. Set the unit to Playback mode.
3. Check that the 2.51 MHz sine waveform is present.
4. Move the scope to pin 3 of IC4.
5. Check that the 1.867 kHz rectangular waveform is present.

6.4.3 Capstan sampling position adjustment

1. Connect the oscilloscope to TP-11 (CAP. TRAPEZOID) on the Audio/Servo circuit board.
2. Set the unit to Playback mode.
3. Adjust R66 (CAP. SAMPLE POSITION) for 75 msec positive flat duration for the waveform at TP. 11. See Fig. 6-4.

Note: The coupling of the oscilloscope probe must be set to AC mode.

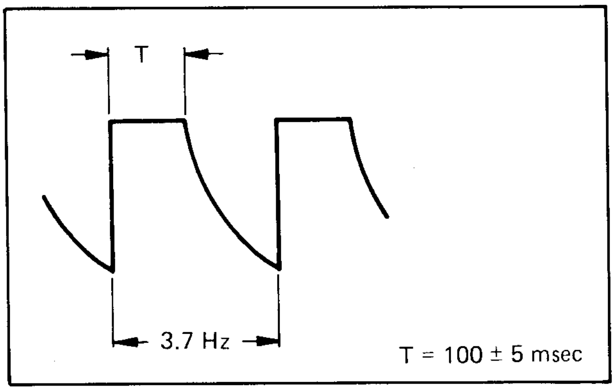


Fig. 6-4 Waveform of capstan sampling position

6.4.4 Adjustment of tape speed

1. Set the unit to Playback mode.
2. Play back the JVC alignment tape to reproduce the audio 3-kHz signal.
3. Connect the frequency counter to TP-19 (AUDIO OUT) on Audio/Servo circuit board.
4. Check that the frequency of TP-19 is 3000 Hz ± 0.3% (2991-3009 Hz)

6.4.5 Check of capstan motor input

1. Connect the oscilloscope to TP-17 (CAP. INVERT IN) on the Audio/Servo circuit board.
2. Set the unit Record mode with the video signal as input.
3. Verify that the DC level of TP-17 is with the range; 6–8 volts.
4. Set the unit to Play mode. Then press the PAUSE key and verify the AC ripple of TP-17 as shown in Fig. 6-5. If the AC ripple is more than 1 volts peak-to-peak on TP-17, the capstan motor will have to be replaced.

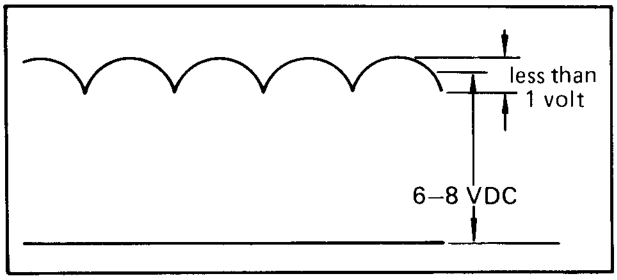


Fig. 6-5 AC ripple of drum motor input

– DRUM SERVO CIRCUIT –

6.4.6 Drum sampling waveform check

1. Set the unit to record mode with video signal as input.
2. Connect the oscilloscope to TP-9 (DRUM SAMPLING) on servo circuit of the Audio/Servo printed circuit board.
3. Check the reference signal position as shown in Fig. 6-6.

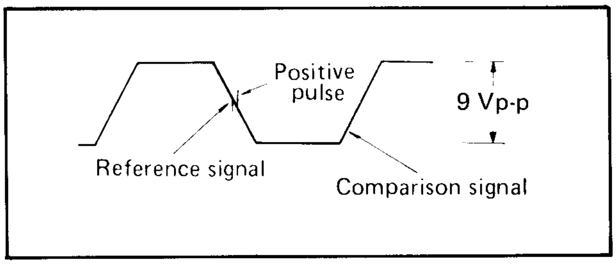


Fig. 6-6 Drum sampling waveform

4. If no reference signal appears at TP-9, check the following.

- Input video signal
  Connect the oscilloscope to TP-2(VIDEO IN) and check the input video signal as shown in Fig. 6-7.

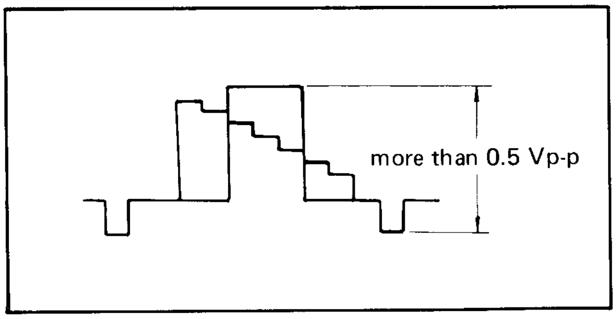


Fig. 6-7 Input video signal

- Sync separator out
  Connect the oscilloscope to TP-1 (SYNC OUT) and check the level of waveform as shown in Fig. 6-8.

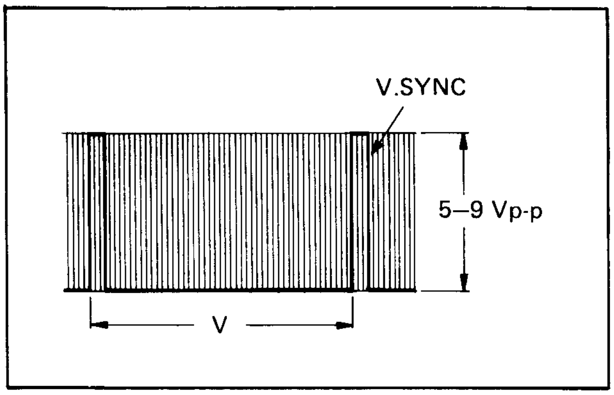


Fig. 6-8 Sync separator out

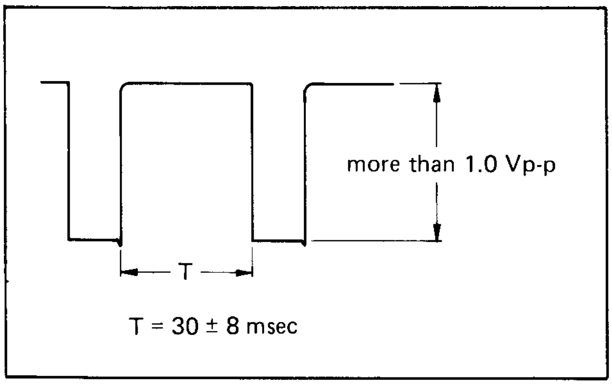


Fig. 6-9 Recording control signal

- Recording control signal
  Connect the oscilloscope to TP-3 (CTL OUT) and check the waveform as shown in Fig. 6-9.

5. If no comparison signal (sawtooth waveform) appears at TP-9, check the following.

- Drum pulse
  Connect the oscilloscope to TP-5 (CH-1 D. PULSE IN) and adjust R23 (D. PULSE LEVEL) so that the negative level of pulse is 0.6 volts peak to peak as shown in Fig. 6-10.
  Move the probe to TP-6 (CH-2 D. PULSE IN) and check that the negative level of pulse is 0.6 ± 0.15 volts peak-to-peak.

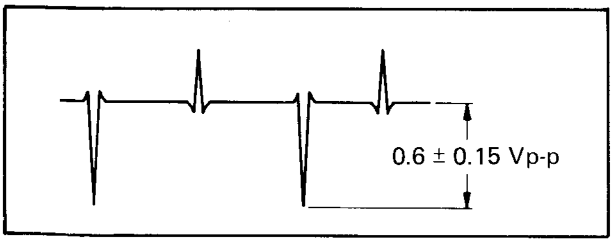


Fig. 6-10 Drum pulse

- Flip-Flop
  Connect the oscilloscope to TP-7 (DRUM F. F. OUT) and check the waveform as shown in Fig. 6-11.

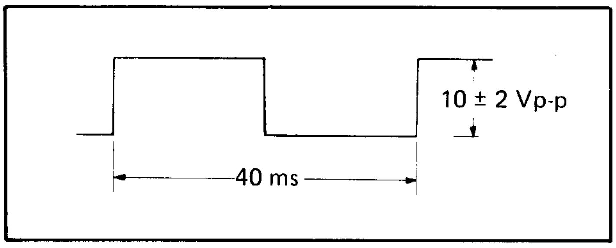


Fig. 6-11 Drum Flip-Flop

- If reference signal is not locked on the comparison signal at TP-9, the drum servo circuit is improperly adjusted or has failed, so that readjustment or repair is needed.

6.4.7 Drum discriminator gain adjustment

1. Turn off the power switch.
2. Connect the DC (power supply) to TP-15 (DRUM M. D. A. IN) and supply 1.0 volt DC. At this time, when the drum motor rotates, stop the motor rotation by hand.
3. Connect the DC voltmenter between TP-14 (DRUM INVERT IN) and TP-16 (DRUM NON-INVERT IN) as shown in Fig. 6-12.
4. Adjust R52 (DRUM DISCRI.) so that the level of DC voltmeter is –5.1 ± 0.5 m VDC.
5. Turn the upper drum slightly, then repeat step 4 above.

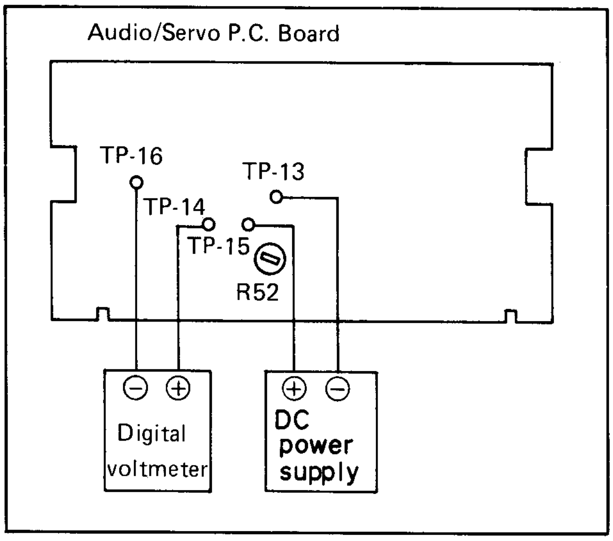


Fig. 6-12

6.4.8 Drum Free-running adjustment

1. Bridge across TP-8 (DRUM PHASE ERROR) and TP-10 (DRUM NON-LINEAR OUT) on the Audio/Servo circuit board.
2. Connect TP-3 (CONTROL OUT) on Audio/Servo circuit board to ground.

3. Set the unit to Record mode, then press the PAUSE key with video signal or TV program as input.
4. Connect the external sync connector on the oscilloscope to TP-7 (DRUM F. F. OUT) of the Audio/Servo circuit board.
5. Connect the oscilloscope to TP-2 (VIDEO IN) and adjust R49 (DRUM SAMPLING POSITION) so that the video signal is synchronized with the external sync signal.
6. After above adjustment, remove the short-circuit between TP-8 and TP-10, then check that the V-rate waveform does not move more than 1 field in four seconds.
7. Finally, remove the short-circuit between TP-3 and ground.

6.4.9 Check of drum phase error

1. Set the unit to Record mode and then press the PAUSE key with a video signal as input.
2. Connect the oscilloscope to TP-8 (D. PHASE ERROR) on the Audio/Servo circuit board.
3. Check that the DC voltage at TP-8 is 4.3 ± 0.3 volts DC.

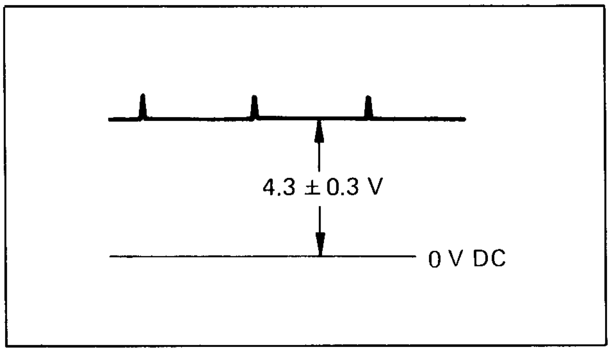


Fig. 6-13 Drum phase error

6.4.10 Drum motor input check

1. Set the unit to Record mode with the video signal as input.
2. After the servo circuit locked, connect the oscilloscope to TP-16 (DRUM INVERT IN) on the Audio/Servo circuit board.
3. Verify that the DC level of TP-16 is within the range; 6–8 volts.

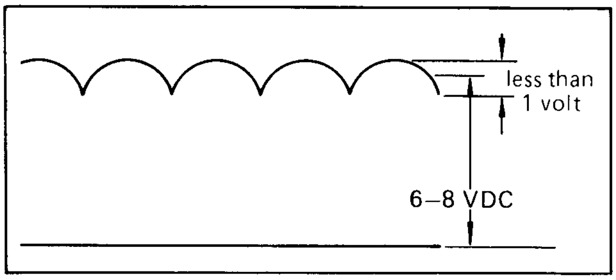


Fig. 6-14 AC ripple of drum motor input

4. Set the unit to Play mode. Then press the PAUSE key and verify the AC ripple of TP-16 as shown in Fig. 6-14. If the AC ripple is more than 1 volts peak-to-peak on TP-16, the drum motor will have to be replaced.

6.4.11 Playback switching point adjustment

1. Play back the JVC alignment tape MH-2 to reproduce the stair-step segment.
2. Set the oscilloscope externally from TP-7 (DRUM F. F. OUT) of the Audio/Servo circuit board.
3. Set the trigger slope of the scope to minus "–".
4. Connect the oscilloscope to TP-2 (VIDEO IN) on the Audio/Servo circuit board, and adjust R21 (CH-1 SW PHASE) so that the trigger point (switching point) is 5.5 to 7.5 H before the vertical sync signal as shown in Fig. 6-15.

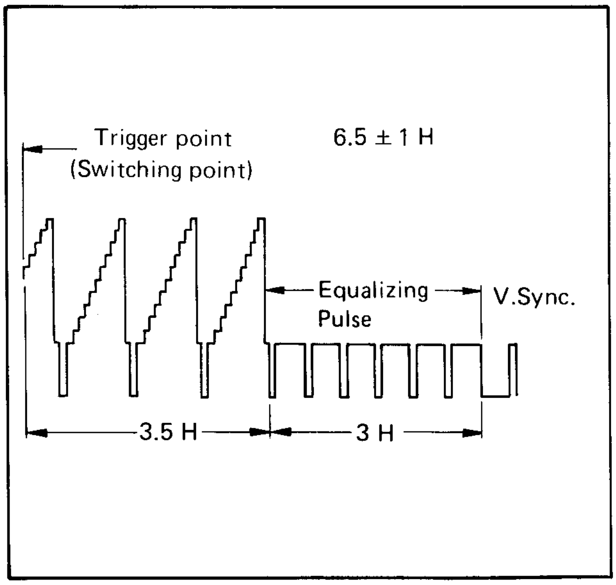


Fig. 6-15 Switching point adjustment

5. Set the trigger slope of the oscilloscope to plus "+" and adjust F24 (CH-2 SW PHASE) on the Audio/Servo circuit board so that the trgger point (switching point) becomes the same value as obtained above step 4.

6.4.12 Recording switching point adjustment

1. Set the unit to the Record mode with the video signal as input.
2. Set the oscilloscope externally from TP-7 (DRUM F. F. OUT) on the Audio/Servo circuit board.
3. Set the trigger slope of the oscilloscope to minus "_".
4. Connect the oscilloscope to TP-2 (VIDEO IN) on the Audio/Servo circuit board.
5. Adjust R8 (REC SW) on Audio/Servo circuit board so that the trigger point (switching point) is 6.5 ± 0.5 H prior to the vertical sync signal. Refer to Fig. 6-15.

6.4.13 Tracking preset adjustment

1. Record, then playback, the video signal.
2. Connect the oscilloscope to TP-3 (CTL OUT) on the Audio/Server circuit board.
3. Turn the TRACKING control to fully counter-clockwise position (clike-stop position) and adjust R10 (PRESET) so that a clear picture is obtained.
4. Check that the waveform at TP-3 is observed as shown in Fig. 6-16.

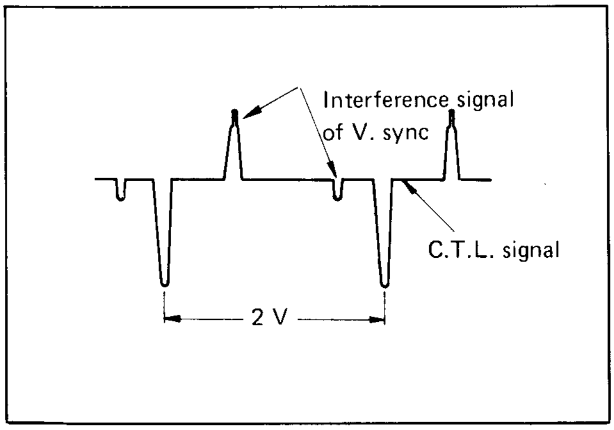


Fig. 6-16 Waveform of control pulse

6.4.14 Tracking control check

1. Play back the JVC alignment tape MH-2 to reproduce the stari-step segment.
2. Turn the TRACKING control to the fully counter-clockwise position (FIX position) and check that the picture is the same as the best picture obtained by turning the TRACKING control manually.
3. If a noisy picture (as compared with manual position) is observed, adjust the position of the Audio/Control head.
4. Connect the oscilloscope to TP-7 (P. B. FM OUT) on the Pre/Record Amplifier circuit board.
5. Check that the level difference between the FIX position's level and maximum level obtained manually is less than 1 dB.

6.4.15 Playback control signal check

1. Play back the JVC alignment tape to reproduce the stair-step segment.
2. Connect the oscilloscope to TP-3 (CTL OUT) on servo circuit of the Audio/Servo printed circuit board.
3. Verify the negative pulse of the control signal as shown in Fig. 6-17.
4. Record then play back the video signal, and verify the pulse level as same as step 3.

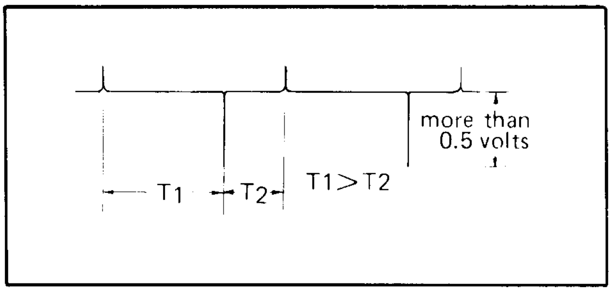


Fig. 6-17 Control signal

6.4.16 Drum sampling position check

1. Record then play back the video signal.
2. Connect the oscilloscope to TP-9 (DRUM SAMPLING) on the servo cicuit and verify the waveform during recording and playback as shown in Fig. 6-18.

   RECORDING: Down ramp of the sawtooth waveform (T) is 4.5 ± 1.5 msec

   PLAYBACK: Down ramp of the sawtooth waveform (T) is 10 ± 2.5 msec
3. Check the position of drum sampling pulse and stability of the pulse at the center of ramp.

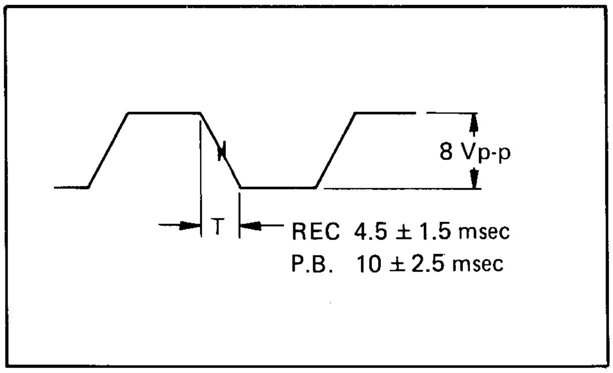


Fig. 6-18 Drum sampling waveform

6.4.17 Lock-in time check

1. Record, then play back the video signal.
2. Check for a period of 8 seconds or less, from the time tape traveling begins in the Play mode, until the time a stable picture appears on the TV screen.

6.4.18 Operation check of pinch roller solenoid

1. Set the unit to Record mode, and then press the PAUSE key.
2. Connect the oscilloscope to connectors 63 on the Junction board.
3. Release the PAUSE key, and check that a negative pulse width is within 70—130 msec.

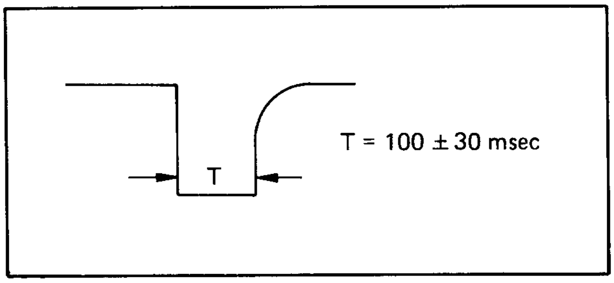


Fig. 6-19 Pause solenoid drive waveform

6.5 LUMINANCE AND CHROMINANCE SIGNAL RECORDING SYSTEM

Refer to Fig. 6-61 "Luminance/Chrominance (Y/C) Amplifier printed circuit board and Fig. 6-60 " Pre/ Record Amplifier printed circuig board.

6.5.1 Adjustment of video head resonance and Q (quality factor)

NOTE: This adjustment is genrally unnnecessary except when replacing the video head assembly.

1. Turn R33 (CH-1 HEAD Q) fully counterclockwise and R34 (CH-2 HEAD Q) fully clockwise.

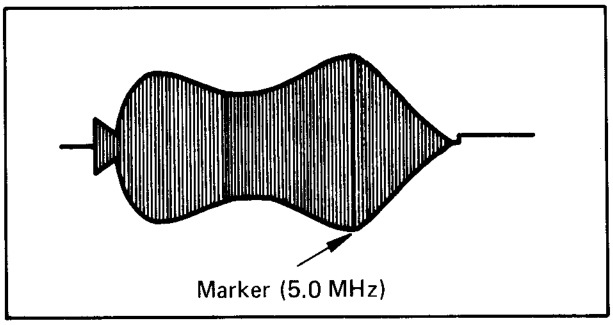


Fig. 6-20 RF signal

2. Connect the oscilloscope to TP-4 (CH-1 FM OUT) on the pre-amplifier circuit of the Pre/Record Amplifier printed circuit board.
3. Play back the JVC alignment tape to reproduce the RF segment.
4. Adjust C18 (CH-1 RESON) so that the peak resonance at marker (5.0 M) becomes as shown in Fig. 6-20.
5. Connect the oscilloscope to TP-5 (CH-2 FM OUT) on the pre-amplifier circuit.
6. Adjust C19 (CH-2 RESON) in the same manner as above (CH-1 adjustment).
7. Record a monoscope or aquivalent signal and then play back.
8. If there is flicker or black fringing around bright objects, adjust R33 or R34.

6.5.2 FM channel balance adjustment

1. Play back the JVC alignment tape to reproduce the color bar segment.
2. Connect the oscilloscope to TP-7 (P.B. FM OUT) on the pre-amplifier of the Pre/Record Amplifier printed circuit board.
3. Adjust the tracking control knob so that the amplitude of the waveform is maximum.
4. Adjust R48 (FM CH. BALANCE) so that the amplitude of (a) and (b) in Fig. 6-21 are equal to each other.

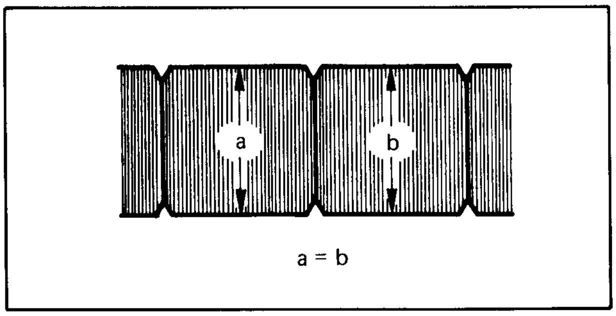


Fig. 6-21 FM channel balance

6.5.3 Drop-out compensator (D. O. C.) adjustment

1. Set the unit to Record mode with a video signal as input and then play it back.
2. Connect the oscilloscope to TP-7 (PB FM OUT) on the Pre/Record circuit board.
3. Adjust R55 (PB FM LEVEL) so that the max-mum amplitude of the waveform at TP-7 is 0.5 volts peak-to-peak.

NOTE: Recheck the above steps after performing the subsection 6.5.9 "FM record level adjustment".

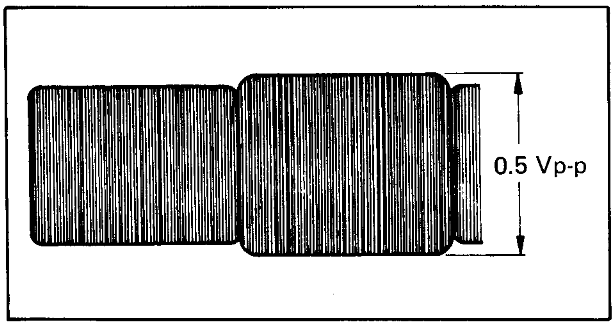


Fig. 6-22 DOC input level

6.5.4 Limiter and carrier balance adjustment

1. Play back the JVC alignment tape to reproduce the color bar segment.
2. Connect the oscilloscope to TP-8 (VIDEO OUT) on the luminance circuit.
3. Adjust R81 (LIMITER BAL-1) so that the carrier leakage at sync tip of the waveform of TP-8 is minimum.

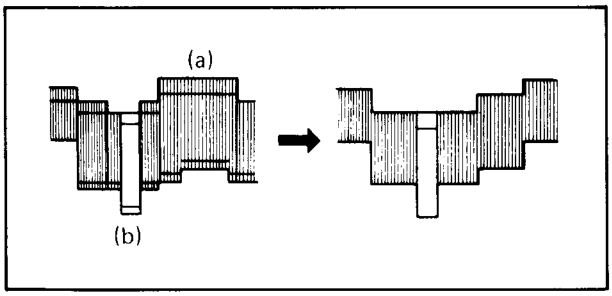


Fig. 6-23 Limiter and Carrier balance

4. Move the oscilloscope probe to TP-11 (DEMOD. OUT) on the luminance circuit.
5. Adjust R98 (LIMITERBAL-2) and R89 (CARRIER BAL.) so that the peak white (a) and sync tip (b) becomes a single line as shown in Fig. 6-23.

6.5.5 Playback video level adjustment

1. Play back the JVC alignment tape to reproduce the color bar segment.

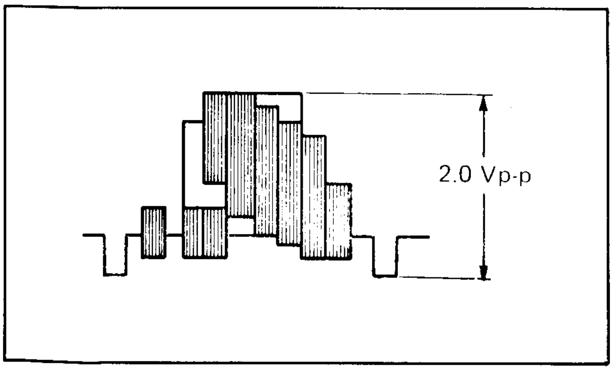


Fig. 6-24 Video output

2. Connect the oscilloscope to TP-8 (VIDEO OUT) on the luminance circuit.
3. Adjust R37 (P. B. OUT LEVEL) so that the level of TP-8 is 2.0 Vp-p as shown in Fig. 6-24.

6.5.6 Carrier and deviation adjustment

A. With high frequency sine-wave generator

1. Set the unit to Record mode with a stair-step signal as input.
2. Connect the oscilloscope to TP-8 (VIDEO OUT) and TP-9 (REC FM OUT) on the luminance circuit, and set the oscilloscope to "A ± B" mode.
3. Connect a high-frequency sine-wave generator output to TP-9 (REC FM OUT) on the luminance circuit.
4. Before adjustment, turn R12 (WHITE CLIP) and R26 (DARK CLIP) to fully counterclockwise position, so that the signal is not limited.
5. Set the frequency of high-frequency sine-wave generator to 3.8 MHz, and adjust R20 (CARRIER SET) so that the waveform observed at the oscilloscope shows a zero beat at the bottom of the waveform as shown in Fig. 6-25.
6. Set the frequency of high-frequency sine-wave generator to 4.8 MHz, and adjust R36 (DEVIATION), so that the waveform observed on the oscilloscope shows a zero beat at the top of the video signal as shown in Fig. 6-26.
7. Then adjust the subsection 6.5.7 "White and dark clip adjustment".

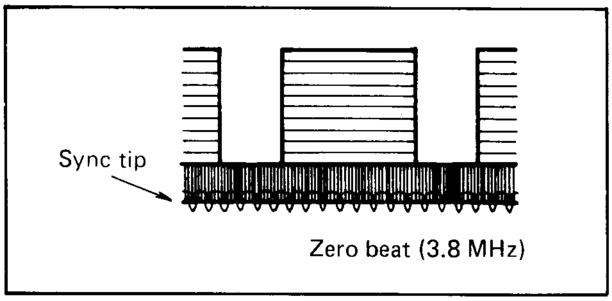


Fig. 6-25 Carrier and deviation adjustment – A

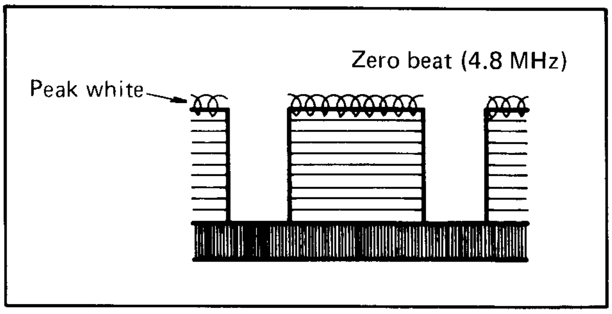


Fig. 6-26 Carrier and deviation adjustment – B

B. With DC power supply and frequency counter

1. Connect the DC power supply to TP-4 (PRE-EMPHA. OUT) on the luminance circuit.
2. Connect the frequency counter to TP-9 (REC. FM OUT) on the luminance circuit.
3. Cnnect the 47μF 16 V capacitor betwen TP-4 (PRE-EMPHA. OUT) and ground as shown in Fig. 6-27.
4. Before adjustment, turn R12 (WHITE CLIP) and R26 (DARK CLIP) fully counterclockwise.
5. Set the unit to Record mode with no video signal as input.
6. Connect the osilloscope to TP-4 on the luminance circuit.
7. Adjust the DC voltage of the power supply so that the frequency of TP-9 is 3.8 MHz and measure the DC voltage of TP-4 with the oscilloscope (approximately 4.3 volts DC).
8. The adjust the DC voltage of the power supply so that the frequency of TP-9 is 4.8 MHz, and measure the DC voltage of TP-4 with the oscilloscope (approximately 6.3 volts DC).
9. Remove the DC power supply and the frequency counter from the test points on the luminance circuit.
10. Supply color bar (or stair-setup) signal as input keeping the Record mode.
11. Adjust R20 (CARRIER SET) so that the DC sync tip level of the waveform at TP-4 is the same DC voltage as measured in step 6.
12. Next adjust R36 (DEVIATION) so that the DC peak white level of the waveform atTP-4 is the same DC voltage as measured in step 7.

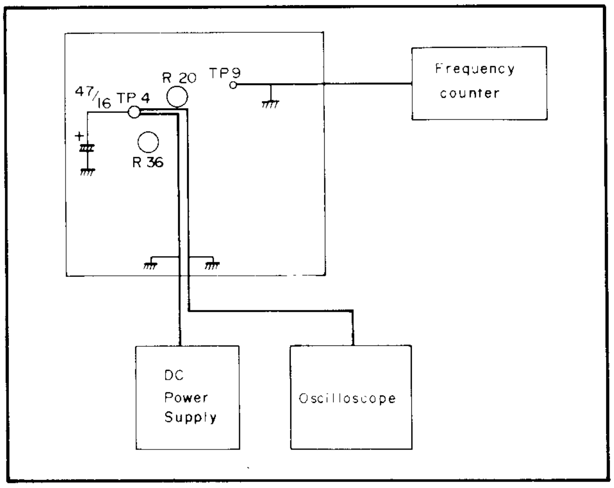
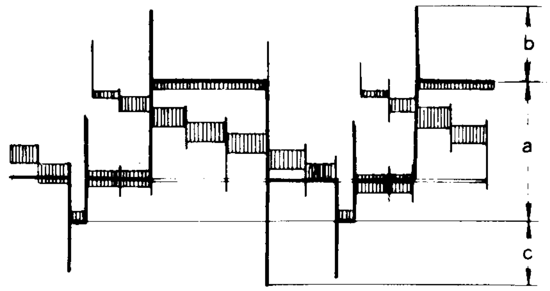


Fig. 6-27 Carrier and deviation adjustment setup

13. Then adjust the subsection 6.5.7 "White and dark clip adjustment".

6.5.7 White and dark clip adjustment

1. Set the unit to Record mode with color bar signal as input.
2. Connect the oscilloscope to TP-4 (PRE-EMPHA. OUT) on the luminance circuit of the Y/C (Luminance/Chrominance signal) printed circuit board.
3. Adjust R12 (WHITE CLIP), so that the amplitude ratio of transient "spikes" with white clip becomes as shown in Fig. 6-28.
4. Adjust R26 (DARK CLIP), so that the amplitude ratio of the transient "spikes" with dark clip becomes as shown in Fig. 6-28.



WHITE CLIP a : b = 1 : 0.55–0.65
DARK CLIP a : c = 1 : 0.45–0.55

Fig. 6-28 White and dark clip adjustment

6.5.8 Adjustment of carrier leak and carrier balance

NOTE: The following adjustment is generally unnecessary except when replacing the FM modulator unit.

1. Set the unit Record mode with the color bar signal as input.
2. Connect the oscilloscope to TP-9 (REC. FM OUT) on the luminance circuit of the Y/C printed circuit board.
3. Adjust C4 (SYMMETRY) and R1 (CARRIER LEAK) on the FM modulator unit so that the modulator waveform is symmetrical to the center and minimum.

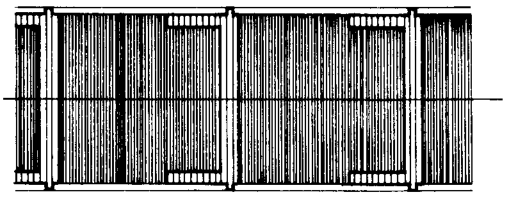


Fig. 6-29 Modulator output

6.5.9 FM record level adjustment

1. Set the unit to Record mode with color bar signal as input.
2. Connect the oscilloscope to TP-1 (REC OUT) on the record amplifier circuit of the Pre/Record Amplifier printed circuit board.
3. Adjust R1 (FM REC LEVEL), so that the level of TP-1 is 3.0 Vp-p as shown in Fig. 6-30.

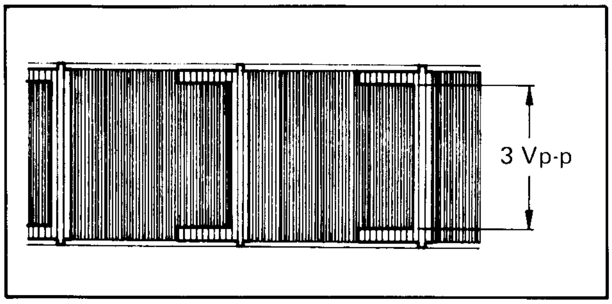


Fig. 6-30 FM record level

6.5.10 Video output level (E-to-E) adjustment

1. Set the unit to Record mode with color bar signal as input.
2. Connect the oscilloscope to TP-8 (VIDEO OUT) on the luminance circuit of the Y/C (Luminance/Chrominance amplifier) printed circuit board.
3. Adjust R66 (E-E LEVEL), so that the level of TP-8 is 2.0 Vp-p.

6.5.11 Aperture adjustment

1. Set the Video mode switch to B/W mode position.
2. Play back JVC alignment tape to reproduce the color bar segment.
3. Connect the oscilloscope to TP-8 (VIDEO OUT) on the luminance circuit.

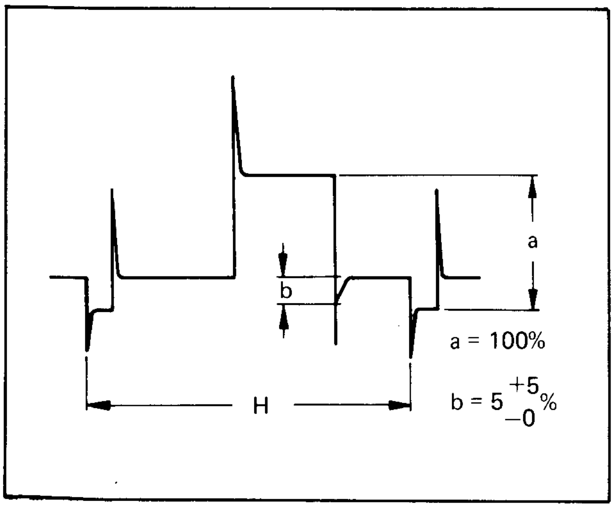


Fig. 6-31 Aperture adjustment

4. Adjust R54 (APERTURE) so that the amplitude of (a) and (b) becomes as shown in Fig. 6-31.
5. After adjustment, record then play back the video signal, and verify the picture on the monitor.

NOTE: After adjustment, the wire must be removed.

6.6 COLOR SIGNAL SYSTEM ADJUSTMENT

Refore Fig. 6-61 "Luminance/Chrominance (Y/C) amplifier printed circuit board", and Fig. 6-60 "Pre/Record Amplifier printed circuit board".

6.6.1 Oscillating frequency (4.43 MHz) adjustment

1. Connect the frequency counter to TP-215 (4.43 MHz X'TAL OSC. OUT) on the Y/C circuit board.
2. Play back the JVC alignment tape to reproduce the color bar segment.
3. Adjust C295 (4.43 MHz OSC.) so that the frequency of TP-215 is 4.433619 MHz ± 40 Hz.

6.6.2 Variable crystal oscillator (4.43 MHz) adjustment

1. Set the unit Record mode with color bar signal as input.
2. Connect TP-222 to ground.
3. Connect the oscilloscope to TP219 on the Y/C circuit board.
4. Adjust R249 (V. X. O.) so that the frequency of TP-219 is 5.060571 MHz (4.435571 + 0.625) ± 30 Hz.

6.6.3 AFC detector reference signal input adjustment

1. Set the unit to Record mode with color bar signal as input.
2. Connect the oscilloscope to TP-218 (Fh REFERENCE OUT) on the Y/C circuit board.
3. Adjust R301 (PULSE WIDTH) so that the puls width of TP-218 is as shown in Fig. 6-32.

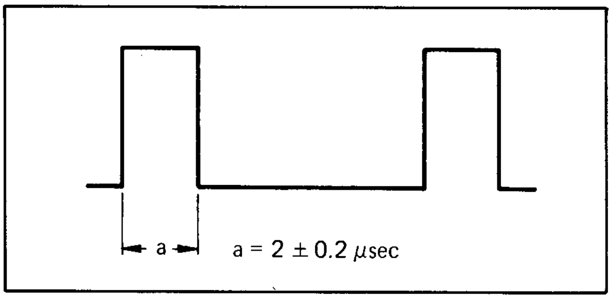


Fig. 6-32 AFC Detector reference signal

6.6.4 AFC adjustment

1. Set the unit to Record mode with the color bar signal as input.
2. Set the oscilloscope externally from TP-1 (sync out) on the Audio/Servo circuit board.
3. Connect the CH-1 of the oscilloscope to TP-218 (Fh REFERENCE OUT) and CH-2 to TP-214 (AFC SAWTOOTH) on the Y/C circuit board. Select the CHOP mode.
4. Adjust R311 (AFC) so that width of "t" is 4 μs as shown in Fig. 6-33.

NOTE: Subsection 6.6.1, 6.6.2, 6.6.3, 6.6.4 describe very important adjustments for the color A. P. C and A. F. C. circuit, so check these section first, then perform the following adjustment.

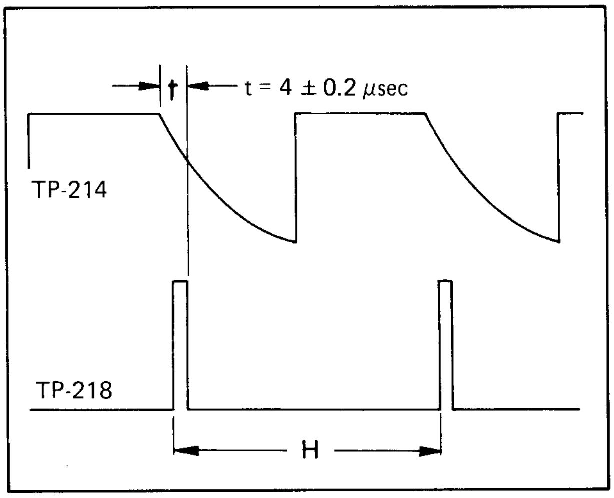


Fig. 6-33 AFC adjustment

6.6.5 Playback color channel balance adjustment

1. Play back the JVC alignment tape to reproduce the color bar segment.
2. Connect the oscilloscope to TP-6 (P. B. COLOR OUT) on the pre-amplifier circuit of Pre/Rec amplifier circuit board.

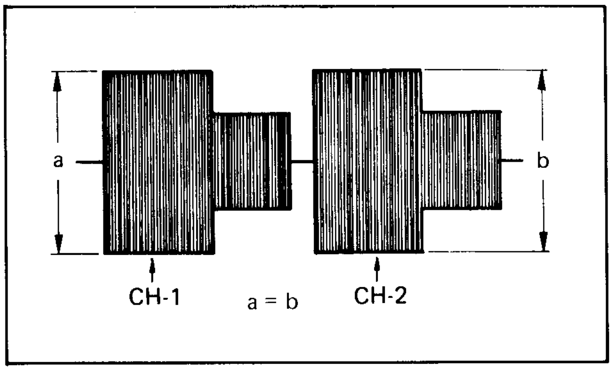


Fig. 6-34 Playback color channel balance

3. Adjust the levels to be equal by using R49 (P. B. COLOR CH. BALANCE) as shown in Fig. 6-34.

6.6.6 Playback color level adjustment

1. Play back the JVC alignment tape to reproduce the color bar segment.
2. Connect the oscilloscope to TP-202 (ACC IN) on the color circuit of the Y/C circuit board.
3. Adjust R52 (P. B. COLOR LEVEL) of Pre/Rec board so that the level of TP-202 is 0.2 ± 0.05 Vp-p as shown in Fig. 6-35.

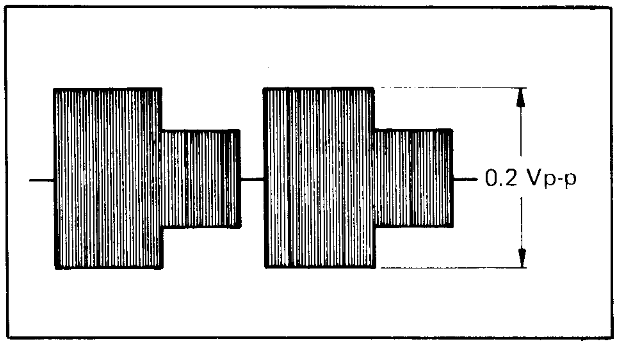


Fig. 6-35 Playback color level

6.6.7 ACC output level adjustment

1. Play back the JVC alignment tape to reproduce the color bar segment.
2. Connect the oscilloscope to TP-203 (ACC OUT) on the Y/C printed circuit board.
3. Adjust R335 (ACC OUT LEVEL) so that the level of TP203 is 0.3 ± 0.04 Vp-p as shown in Fig. 6-36.

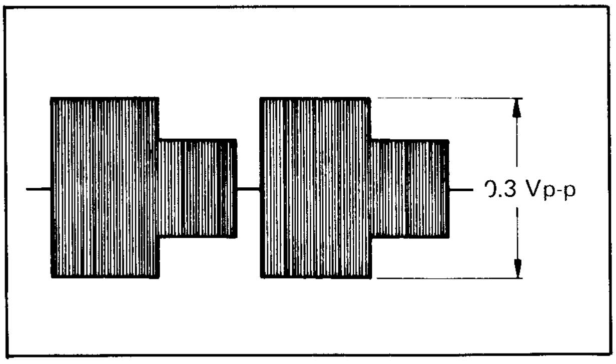


Fig. 6-36 ACC output level

6.6.8 Main converter balance adjustment

1. Play back the JVC alignment tape to reproduce the color bar segment.
2. Connect the oscilloscope to TP-206 (P. B. COLOR OUT) on the color circuit of the Luminance/Chrominance printed circuit board.
3. Adjust R216 (CONV. BAL.) so that the carrier leak of TP-206 minimum, as shown in Fig. 6-37.

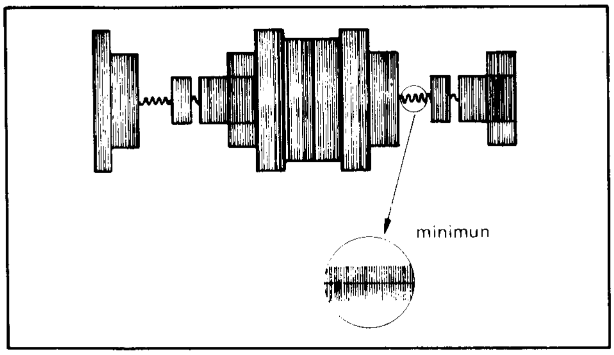


Fig. 6-37 Main converter balance adjustment

6.6.9 Playback color output level adjustment

1. Play back the JVC alignment tape to reproduce the color bar segment.
2. Connect the oscilloscope to TP-8 (VIDEO OUT) on the Y/C (Luminance/Chrominance) printed circuit board.
3. Adjust R215 (COLOR LEVEL) so that the level of color burst signal is 0.5 Vp-p as shown in Fig. 6-38.

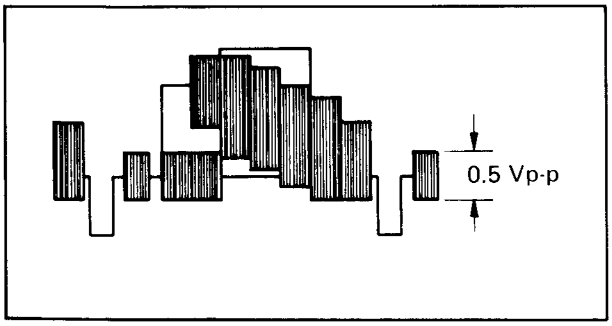


Fig. 6-38 Playback color output level adjustment

6.6.10 Color recording level and channel balance adjustment

1. Set the unit to Record mode with color bar signal as input.
2. Connect the oscilloscope to TP-202 (P. B. COLOR OUT) on the Y/C circuit board.
3. Adjust R24 (COLOR REC BALANCE) during Record mode then perform playback, so that the color levels to be equal.
4. Adjust R2 (COLOR LEVEL) on the record amplifier circuit during Record mode, then play back it, so that the level of TP-202 is 0.2 ± 0.05 Vp-p as shown in Fig. 6-39.
5. Repeat steps 3 and 4 above two or three times.

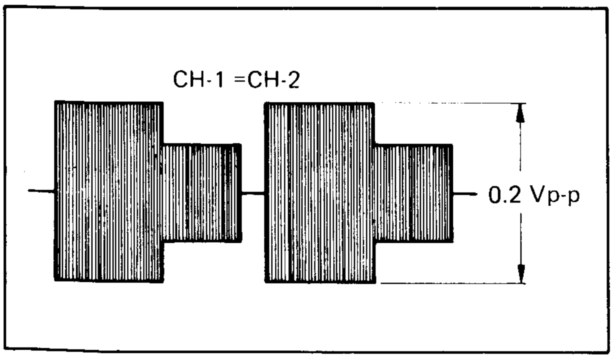


Fig. 6-39 Color level

6.6.11 FM channel balance check

1. Set the unit to Record mode with video signal as input, then play it back.
2. Connect the oscilloscope to TP-7 (P. B. FM OUT) on the Pre/rec amplifier circuit board.
3. Check the level difference between the channels is within 1 dB as shown in Fig. 6-40.
4. Recheck the subsection 6.5.3 "Drop-out compensator (D. O. C.) adjustment.

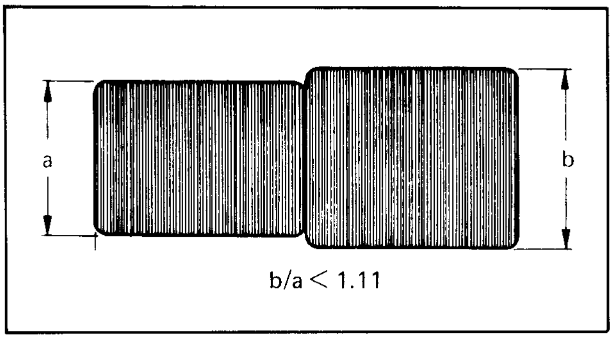


Fig. 6-40 FM channel balance

6.6.12 Record color killer adjustment

1. Connect the DC voltmeter to TP-211 on the Luminance and Chrominance (Y/C) board and set the Video mode switch to AUTO position.
2. Set the unit to Record mode with color bar signal as input.

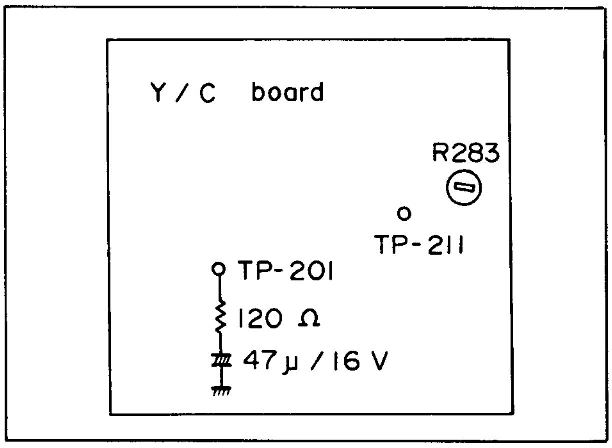


Fig. 6-41 Record color killer

3. The connect an attenuator between the TP-201 and the ground as shown in Fig. 6-40.
4. Adjust R283 (REC COLOR KILLER) until high voltage (10–11 volts DC) is appeared.
5. Remove the attenuator and check the high voltage is present at TP-211 with the black and white signal.
6. Then connect the DC voltmeter to TP-12 of the luminance and chrominance (Y/C board.
7. Check the DC potential at TP-12.

P. B. MODE SW	TP-12
COLOUR	Low
AUTO	
B/W	High (more than 8 V DC)

6.6.13 2-H delay line filter adjustment

1. Set the unit to Record mode with color bar signal as input, then play it back.
2. Connect the oscilloscope to TP-208 on the Luminance and Chrominance (Y/C) board.
3. Adjust R238 and L205 several times, so that the level of TP-208 is minimum.

6.7 AUDIO AMPLIFIER CIRCUIT ADJUSTMENT

Refer to Fig. 6-62 "Audio/Servo amplifier printed circuit board".

6.7.1 Playback level adjustment

1. Play back the JVC alignment tape MH-2 to reproduce the color bar segment.

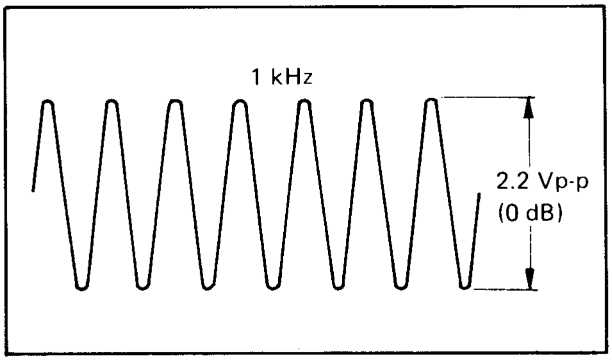


Fig. 6-42 Playback level

2. Connect the oscilloscope to TP-19 (AUDIO OUT) on the audio amplifier circuit of the Audio/Servo amplifier circuit board.
3. Adjust R117 (P. B. LEVEL) so that the level of TP-19 is 2.2 Vp-p (0 dB) as shown in Fig. 6-42.

6.7.2 E-to-E level adjustment

1. Set the unit to Record mode with 1 kHz sine-waveform, 0.22 Vp-p (−20 dB) as input.
2. Connect the oscilloscope to TP-19 (AUDIO OUT) on the audio amplifier circuit.
3. Adjust R102 (E-E LEVEL) so that the level of TP-19 is 2.2 Vp-p (0 dB).

6.7.3 Bias level adjustment

1. Set the unit to Record mode.
2. Connect the oscilloscope to TP-20 (AUDIO REC OUT) on the Audio/Servo circuit board.
3. Adjust R144 (BIAS LEVEL) so that the level of TP-20 is 60 Vp-p and also, check the level of TP-21 (ERASE HEAD IN) is more than 60 Vp-p as shown in Fig. 6-43.

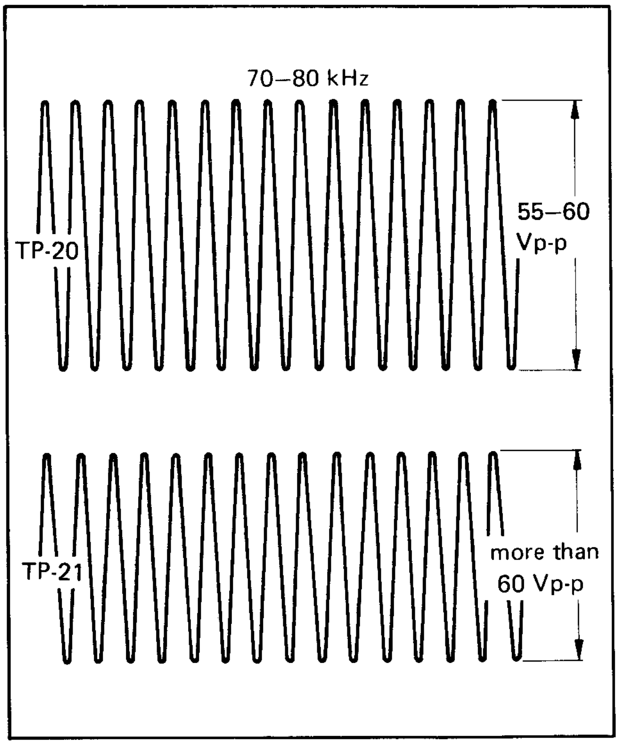


Fig. 6-43 Bias level

6.7.4 Bias leak adjustment

1. Set the unit to Record mode with no signal as input.
2. Connect the oscilloscope to TP-19 (AUDIO OUT) on the audio circuit.

3. Adjust L3 so that the leak of bias on TP-19 is minimum (less than 0.2 Vp-p).

6.7.5 Record level adjustment

1. Set the unit to Record mode with 1 kHz sine-waveform signal, 0.22 Vp-p (−20 dB) as input.
2. Connect the oscilloscope to TP-18 (AUDIO REC OUT) on the audio amplifier circuit.
3. Adjust R126 (REC LEVEL) during Record mode, then play it back so that the level of TP-18 is 2.5 Vp-p at the Playback mode.

6.7.6 Adjustment of recording equalizer

NOTE: This adjustment should be performed after completion of subsections 6.7.1 to 6.7.5.

1. Set the unit to Record mode with 7-kHz sine-waveform signal, 0.07 Vp-p as input.
2. Connect the oscilloscope to TP-19 (AUDIO OUT) on the Audio/Servo circuit board.
3. Adjust R128 (Rec EQ.) during Record mode, then play it back so that the level of TP-19 is within 1.6–3.1 Vp-p at the Playback mode.

6.8 VIDEO TIMER INSPECTION

WARNING:
Unplug the power cord of the "VHS" before installation to avoid possible shock and damage to sensitive IC circuitry.

6.8.1 Check of 7 V AC input

1. Connect an AC voltmeter between pins 2 and 3 of the 6-pin connector.
2. Check for 7 ± 2 V AC.

6.8.2 Check of unregulated 12 V DC input

1. Connect a DC voltmeter at pin 6 of the 6-pin connector.
2. Check for 8–13 V DC.

Note: Measure with POWER SWITCH OFF and ON and during Record mode.

6.8.3 Cycle change

Connect accessory 3-pin socket located at the rear of the video timer to correct power source frequency as shown in Fig. 6-44.

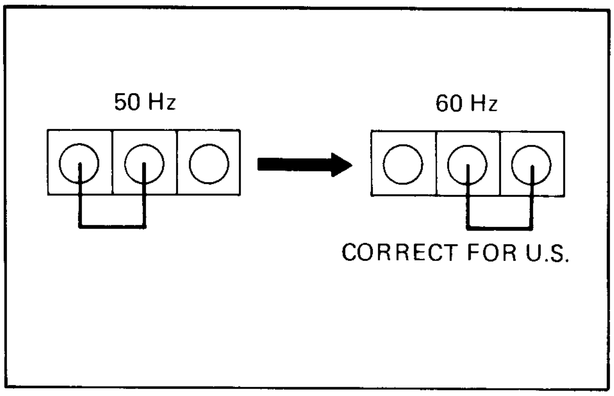


Fig. 6-44 Cycle change connector

6.9 HR-3330EK AND HR-3330EG TUNER UNIT ADJUSTMENTS

6.9.1 Equipment required

1. Oscilloscope
2. IF sweep signal generator with suitable markers. (PIF, SIF)
3. DC power supplies – for IF AGC bias (1.5–5 V, variable).
4. DC power supplies – for video cutoff bias (12 V through 3.3 k-ohms, 1/2 W).
5. Sweep signal supply cable.

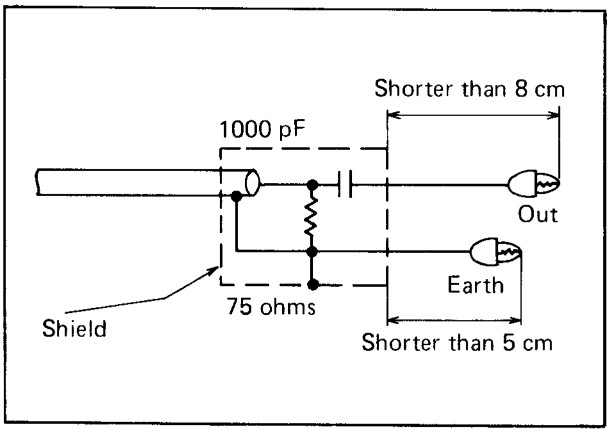


Fig. 6-45 Sweeper output cable

6.9.2 Precautions

1. Refore Fig. 6-63' "'Tuner amplifier printed circuit board.
2. Allow the equipments to get warmed up for more than 30 minutes.

3. Earth wires connecting equipments must well be conductive in high frequency.
4. Connect each earth wire to the PWB earth pattern, not to the chassis earth.
5. In energizing power, observe the following order, and reverse for removing power in order to protect integrated circuits;

   Main power to VHS (E-E mode, TV input mode)
   → IF AGC bias
   → Video cutoff bias

6.9.3 PIF final stage adjustment

1. Connect the IF AGC bias (3.1 V approx.) to TP-14.
2. Connect the video cutoff bias (12 V) to TP-41.
3. Connect the sweep generator earth to TP-17 bridging with TP-E by the earth clip.
4. Connect the sweep generator output to TP-18 and oscilloscope to TP-12.
5. Adjust the sweep generator output level to 80 dBμ.
6. Adjust the IF AGC bias voltage so that the waveform of the final stage has a voltage of 1.6 Vp-p on the oscilloscope as shown in Fig. 6-46.

   Note: IF AGC bias must be readjusted whenever the level exceeds the above range during the course of adjustment.

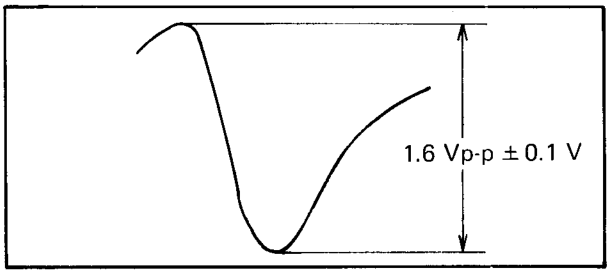


Fig. 6-46

7. Adjust the core of T106 to tune sound trap to the 33.5 MHz (HR-3330EK), 33.4 MHz (HR-3330EG) marker as shown in Fig. 6-47.

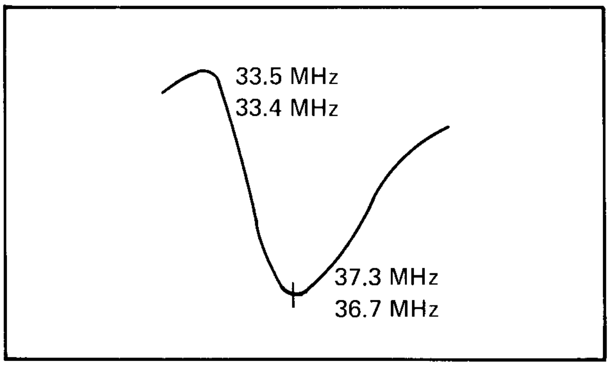


Fig. 6-47

8. Adjust the core of T105 so that the 37.3 MHz (HR-3330EK), 36.7 MHz (HR-3330EG) marker comes to the top of the waveform as shown in Fig. 6-46.
9. Adjust the core of T104 so that the waveform has an equal height at the 35.07 MHz and 39.5 MHz (HR-3330EK), 34.47 MHz and 38.9 MHz (HR-3330EG) markers as shown in Fig. 6-48.

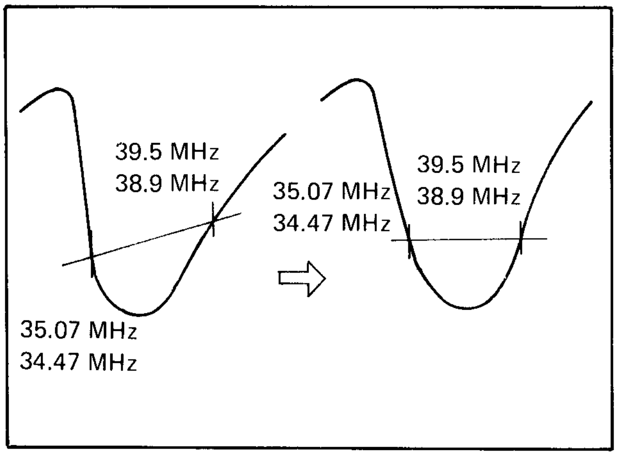


Fig. 6-48

10. Adjust the core of T105 so that the waveform becomes round and symmetrical at around 37.3 MHz (HR-3330EK), 36.7 MHz (HR-3330EG) as shown in Fig. 6-49.

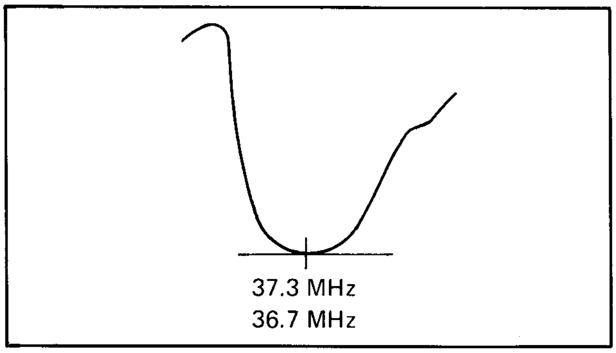


Fig. 6-49

11. Adjust C116 (trimmer cap.) so that the waveform height becomes 62.5 % of the peak level at the 35.07 MHz and 39.5 MHz (HR-3330EK), 34.47 MHz and 38.9 MHz (HR-3330EG) markers as shown in Fig. 6-49.
12. Repeat steps 7 through 10 if necessary so that all the requirement may be met finally.
13. Adjust the core of T106 to exactly readjust the sound trap.
    (Changing the oscilloscope vertical scale to a more sensitive range will be convenient to adjust exactly.)
14. Make sure that the waveform looks that shown in Fig. 6-50.

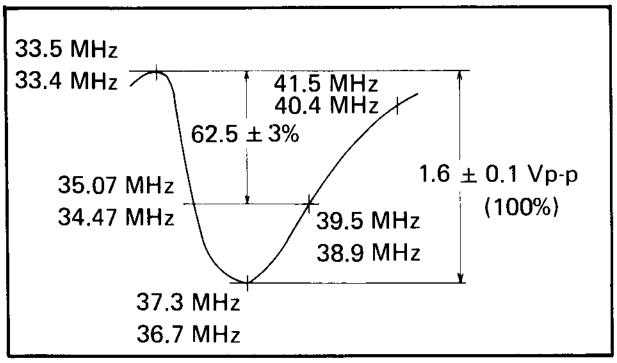

33.5 MHz
33.4 MHz
41.5 MHz
40.4 MHz
62.5 ± 3%
1.6 ± 0.1 Vp-p
(100%)
35.07 MHz
34.47 MHz
39.5 MHz
38.9 MHz
37.3 MHz
36.7 MHz

Fig. 6-50

6.9.4 Overall adjustment

1. Before performing this adjustment, the previous section (PIF final stage adjustment) must be completed.
2. Connect same as subsection 6.9.1 -3.
3. Turn the Noise control (R204) extremely counterclockwise. (Noise should disappear.)
4. Connect the sweeper probe to the tuner TP and the ground lead to the bracket as shown in Fig. 6-63.
5. Connect the oscilloscope to TP-12.
6. Adjust the sweep generator output level to 85 dBμ.
7. Adjust the IF AGC bias voltage so that the waveform has a voltage of 1.6 Vp-p on the oscilloscope as shown in Fig. 6-46.

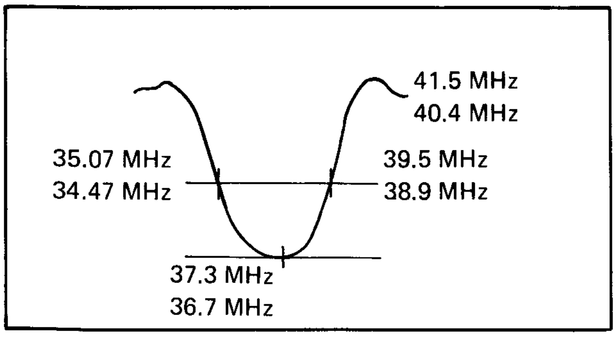

41.5 MHz
40.4 MHz
35.07 MHz
34.47 MHz
39.5 MHz
38.9 MHz
37.3 MHz
36.7 MHz

Fig. 6-51

8. Adjust the tuner core to make the waveform have an equal height at the 35.07 MHz and 39.5 MHz (HR-3330EK), 34.47 MHz and 38.9 MHz (HR-3330EG) markers as shown in Fig. 6-00.
9. Adjust the core of T101 so that the waveform becomes round and symmetrical around the 37.3 MHz (HR-3330EK), 36.7 MHz (HR-3330EG) marker. [Fig. 6-00]
10. Adjust the core T102 to tune the adjacent sound trap to the 41.5 MHz (HR-3330EK), 40.4 MHz (HR-3330EG) marker as shown in Fig. 6-51.
11. Adjust the core of T103 to tune the sound trap to the 33.5 MHz (HR-3330EK), 33.025 MHz (HR-3330EG) marker. At this time, insert a thin copper stick into T106 to shift the dip caused by T106. So, T103 adjustment could be more precisely performed as shown in Fig. 6-52.
12. Adjust C101 (trimmer cap.) so that the waveform height becomes 50% of the peak level at the 35.07 MHz and 39.5 MHz (HR-3330EK), 34.47 MHz and 38.9 MHz (HR-3330EG) markers as shown in Fig. 6-53.
13. Adjust the tuner core and T101 alternately with C101 because adjustments of them are mutually related.
14. Readjusting each trap exactly by turning the cores of T102 and T103, make sure that the waveform looks like that shown in Fig. 6-53.

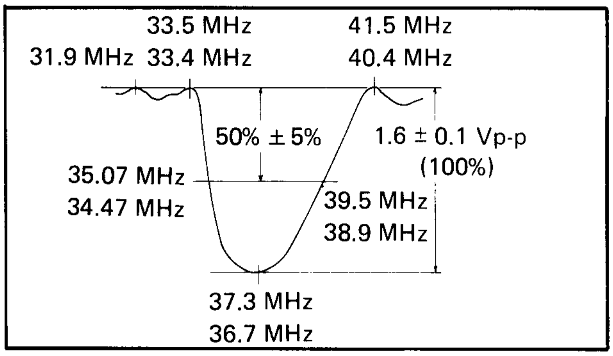

33.5 MHz
41.5 MHz
31.9 MHz
33.4 MHz
40.4 MHz
50% ± 5%
1.6 ± 0.1 Vp-p
(100%)
35.07 MHz
34.47 MHz
39.5 MHz
38.9 MHz
37.3 MHz
36.7 MHz

Fig. 6-53

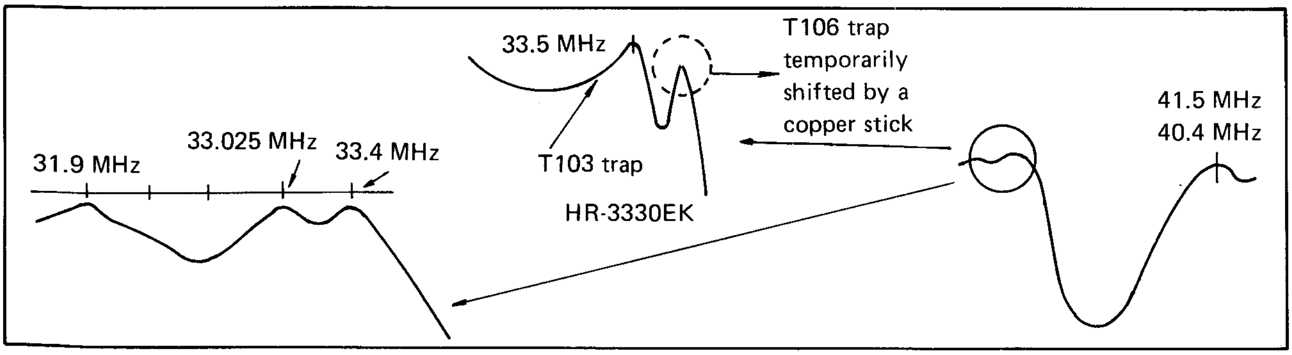

33.5 MHz
T106 trap
temporarily
shifted by a
copper stick
41.5 MHz
40.4 MHz
33.025 MHz
33.4 MHz
31.9 MHz
T103 trap
HR-3330EK

Fig. 6-52

6.9.5 RF AFC adjustment

1. Setting is same as for subsection 6.9.3 (PIF final stage adjustment).
2. Confirm the level of 1.6 Vp-p ± 0.1 V at TP-12.
3. Change the connection of the oscilloscope from TP-12 to TP-16.
   Switch the voltage range of the oscilloscope appropriately to measure the output voltage.
4. Adjust the core of T402 so that the 39.5 MHz (HR-3330EK), 38.9 MHz (HR-3330EG) marker comes to the center of the "S" curve as shown in Fig. 6-54.

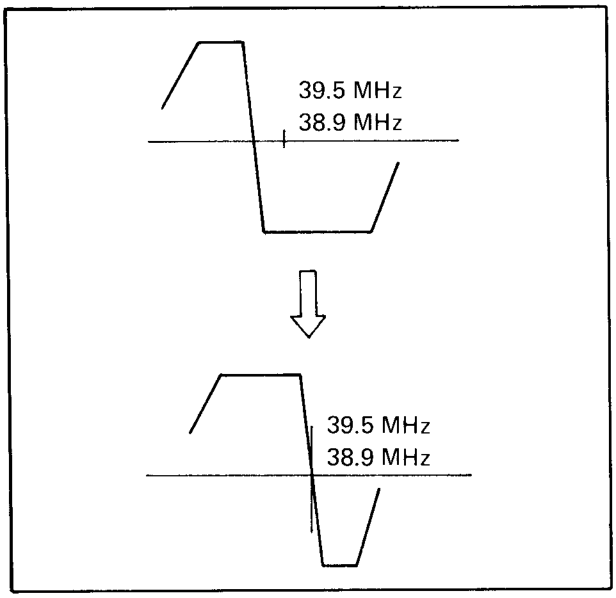


Fig. 6-54

5. Decrease the input level by 6 dB.
   (Do not adjust IF AGC bias at this time.)
6. Adjust the core of T401 so that waveform becomes symmetrical around its center as shown in Fig. 6-55.

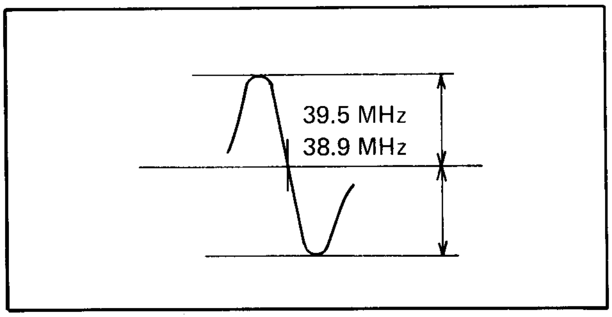


Fig. 6-55

7. Bring the input level back to the original.
   Take the step 4. again.
8. Confirm that both the top and bottom of curve are regulated in level even when input level is lowered by 3 dB as shown in Fig. 6-56.

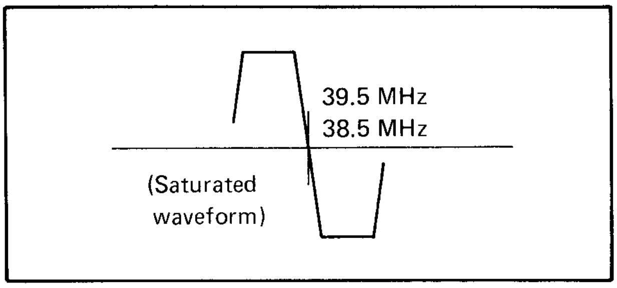


Fig. 6-56

6.9.6 Sound IF adjustment

1. Use an SIF sweep signal generator instead of PIF sweep.
2. Supply an SIF sweep signal to the junction of CF501 and C503.
   Adjust the input to an appropriate level with which the limiter provides enough limitation.
3. Connect the oscilloscope to TP-22 and check the "S" curve.
4. Adjust the core of T502 so that the center of the "S" curve somes to 6.0 MHz (HR-3330EK), 5.5 MHz (HR3330EG) as shown in Fig. 6-57.

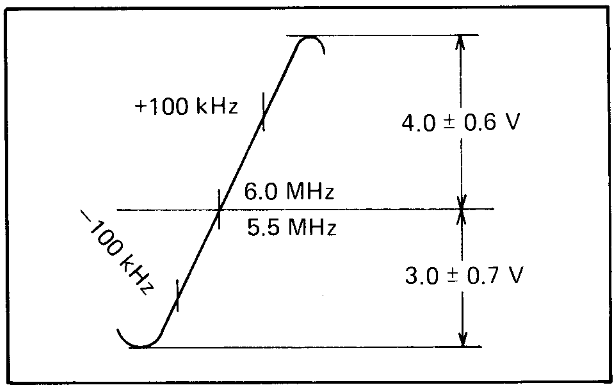


Fig. 6-57

5. Make sure that the markers for 100 kHz sit on within the slant of detection curve.

6.9.7 6.0 MHz (HR-3330EK) / 5.5 MHz (HR-3330EG) trap adjustment

1. Remove all the equipments previously used for alignment except the oscilloscope.
2. Receive an aerial signal containing a sound carrier, and tune to it precisely.
3. Connect the oscilloscope to TP-72 Video Output.
4. Adjust the core of T107 so that the leakage of 6.0 MHz (HR-3330EK), 5.5 MHz (HR-3330EG) carrier component minimize.

6.9.8 Noise adjustment

1. Connect either a video monitor or a TV receiver to the VHS output in order to monitor the picture S/N on the screen.

   It is advisable to darken the brightness slightly for a better visibility of noises.
2. Feed an aerial signal (Test Pattern) with 75 dBμ of the field strength to the VHS aerial input terminal.
3. Make sure the picture shown on the screen is normal.
4. At the first step, turn R204 (Noise Control) to the extreme end in clockwise direction.

   Then, slowly turn it back and stop it when noises on the screen disappear.
5. Check the picture quality with various aerial input levels.

6.9.9 Video level adjustment

1. Feed an aerial color bar pattern signal to the VHS aerial input terminal.
2. Connect the oscilloscope to TP-72 Video Output.
3. Adjust mutually both R206 (Video Level) and R209 (Video Equalizing) so that the luminance level is 0.71 Vp-p, and the chrominance level at magenta portion is 0.33 Vp-p.

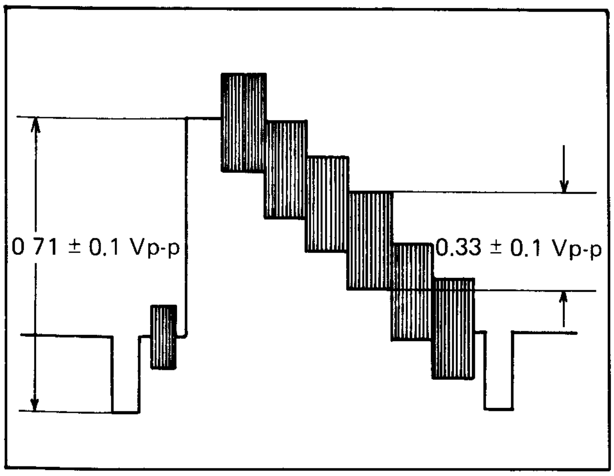


Fig. 6-58

6.9.10 Audio level adjustment

1. Receive an aerial signal containing a continuous sinewave audio signal (1 kHz) with 80% modulation and tune to it precisely.
2. Connect an audio level meter to TP-22.

   Adjust R506 (Audio Level) so that the level at TP-22 is -13^{+1}_{-3} dBs.

6.10 LOCATION OF POTENTIOMETER AND TEST POINTS

6.10.1 Regulator printed circuit board

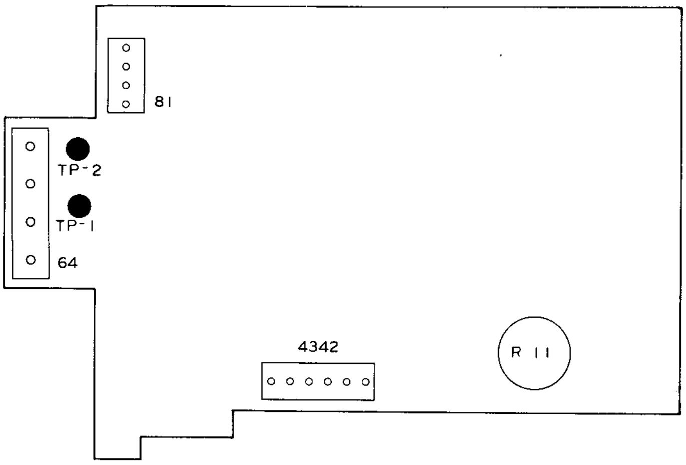

81
TP-2
TP-1
64
4342
R 11

Fig. 6-59 Regulator printed circuit board

6.10.2 Pre/Record (PRE/REC) amplifier printed circuit board

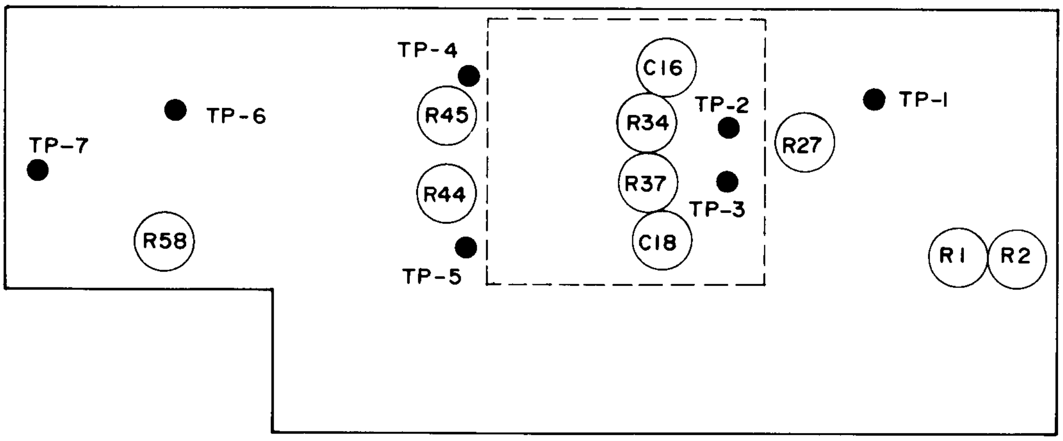

TP-4
C16
TP-6
R45
R34
TP-2
TP-1
TP-7
R27
R44
R37
TP-3
R58
C18
R1
R2
TP-5

Fig. 6-60 Pre/Record (PRE/REC) amplifier printed circuit board

6.10.3 Luminance/Chrominance (Y/C) amplifier printed circuit board

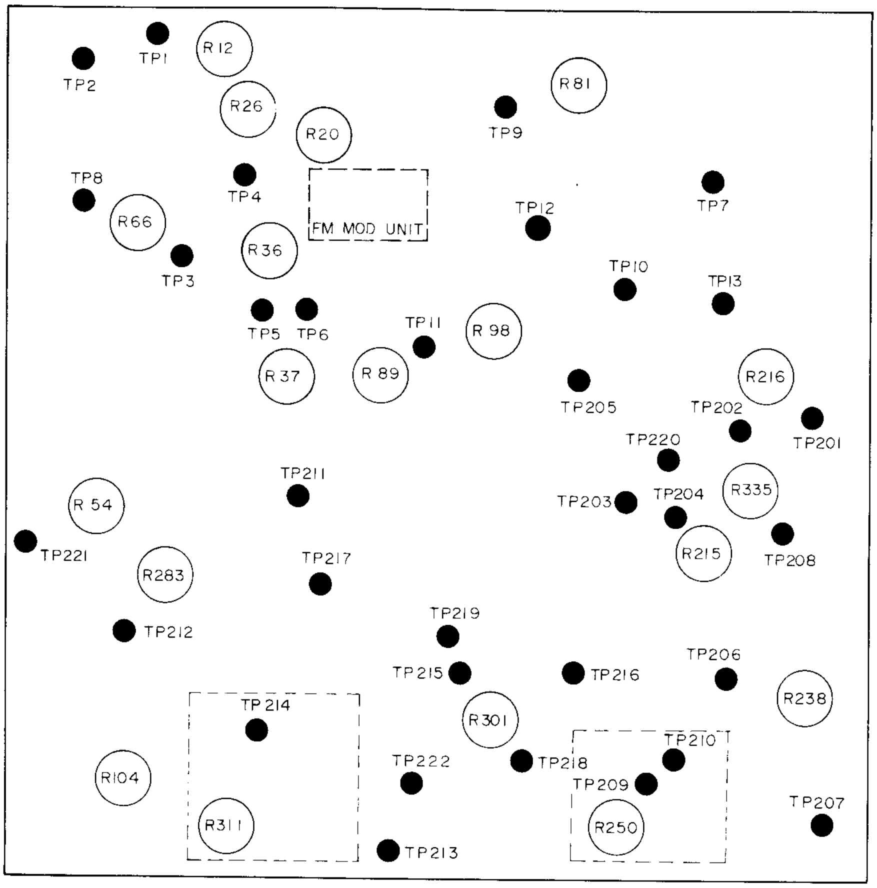

TP1
R 12
TP2
R26
R20
R81
TP9
TP8
TP4
FM MOD UNIT
TP12
TP7
R66
R36
TP3
TP10
TP13
TP5
TP6
TP11
R 98
R 37
R 89
R216
TP205
TP202
TP201
TP220
TP211
R 54
TP203
TP204
R335
TP221
R215
TP208
R283
TP217
TP219
TP212
TP206
TP215
TP216
R238
TP 214
R301
TP210
TP222
TP218
R104
TP209
TP207
R311
R250
TP213

Fig. 6-61 Luminance/Chrominance printed circuit board

6.10.4 Audio/Servo (A/S) amplifier printed circuit board

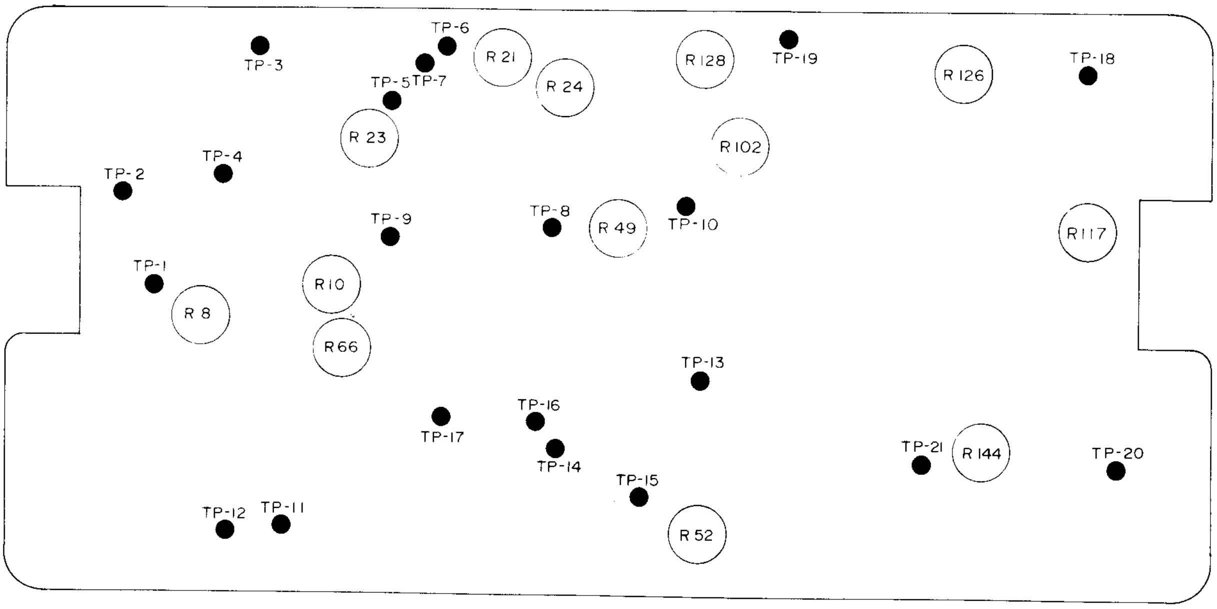

TP-6
TP-3
R 21
R 128
TP-19
R 126
TP-18
TP-5TP-7
R 24
R 23
R 102
TP-4
TP-2
TP-9
TP-8
R 49
TP-10
R 117
TP-1
R 10
R 8
R 66
TP-13
TP-16
TP-17
TP-14
TP-21
R 144
TP-20
TP-15
TP-12
TP-11
R 52

Fig. 6-62 Audio/Servo (A/S) amplifier printed circuit board

6.10.5 Tuner amplifier printed circuit board

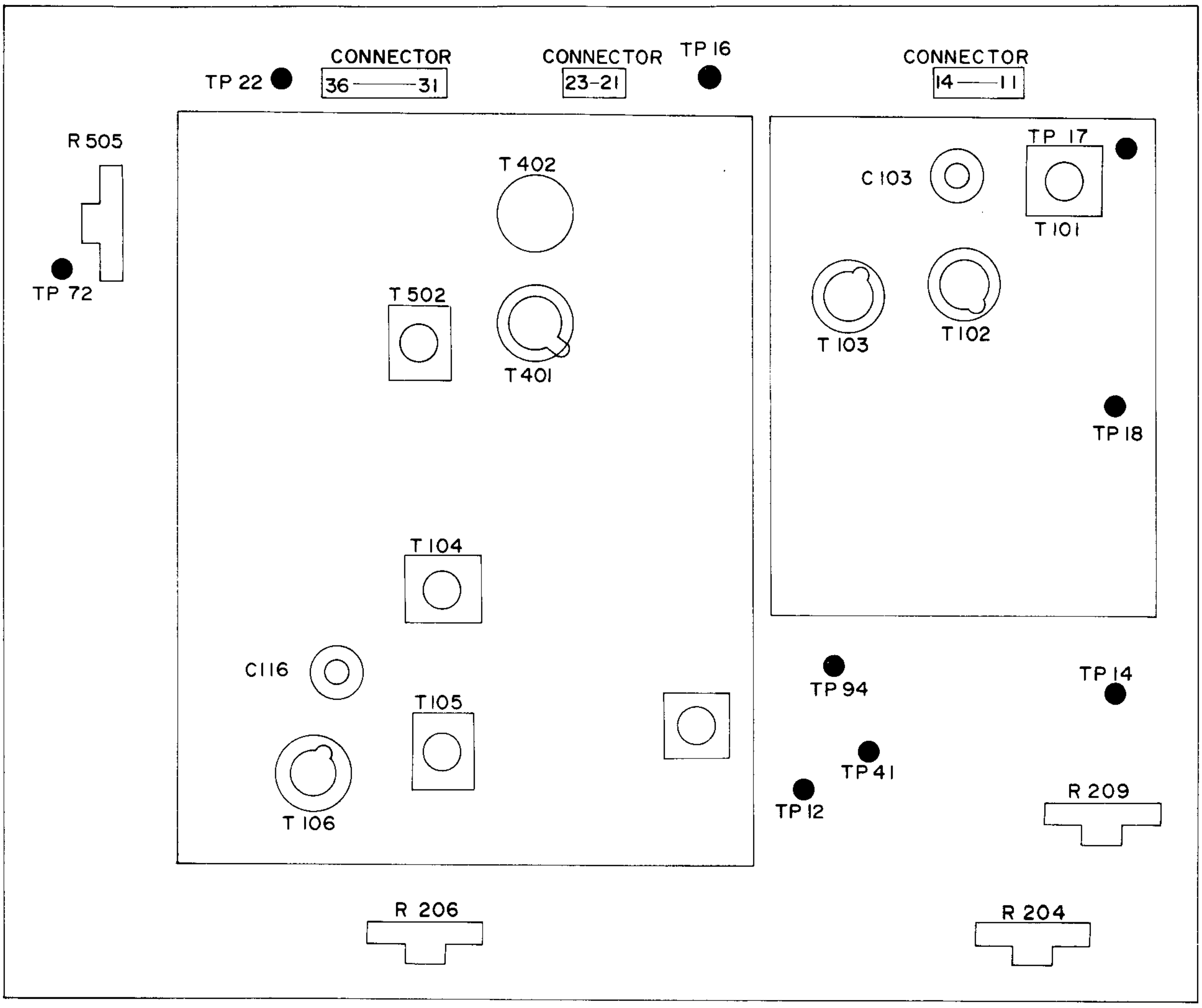
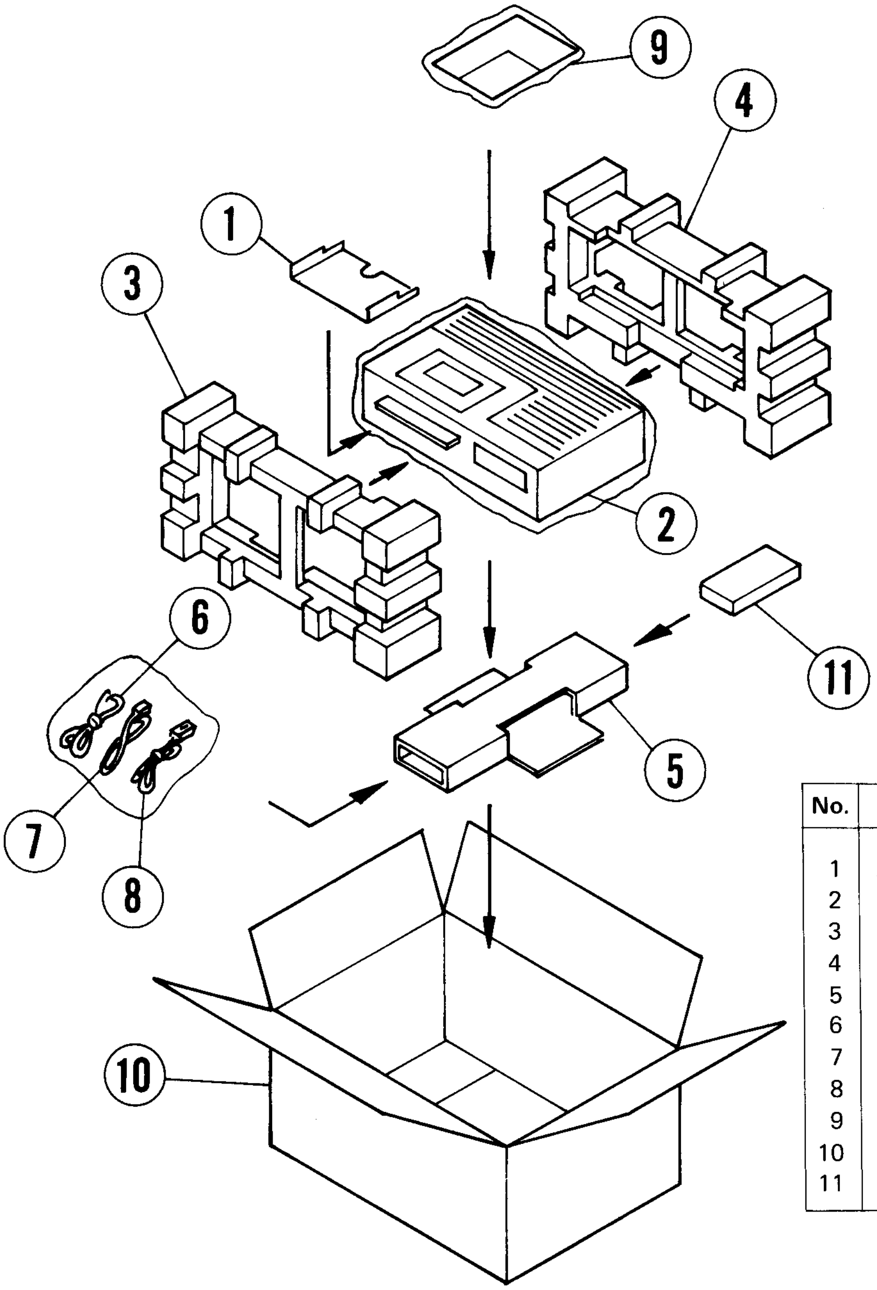

CONNECTOR
36——31
CONNECTOR
23-21
CONNECTOR
14——11
TP 22
TP 16
TP 17
R 505
TP 72
T 402
C 103
T 101
T 502
T 401
T 103
T 102
TP 18
T 104
C116
T105
T 106
TP 94
TP 14
TP 41
TP 12
R 209
R 206
R 204

Fig. 6-63 Tuner amplifier printed circuit board

SECTION 7
REPACKING

The proper repacking procedures are as follows.

1. Set the arm stopper ① into the cassette housing of the Unit.
2. cover the "VHS"②with the plastic bag.
3. Insert the front cushion ③ and rear cushion ④ to "VHS", and place the accessory part ⑤ to bottom of the carton, then the Unit in to the cardboard carton ⑩.
4. Place the accessory parts ⑨ on the Unit.



No.	Name
1	Arm Stopper
2	Unit
3	Front Cushion
4	Rear Cushion
5	Protector
6	Aerial Cable Ass'y
7	Power Cord
8	Remote Control Switch
9	Accessories
10	Cardboard Carton
11	Video Cassette

Fig. 7-1

SECTION 8
TROUBLESHOOTING GUIDE

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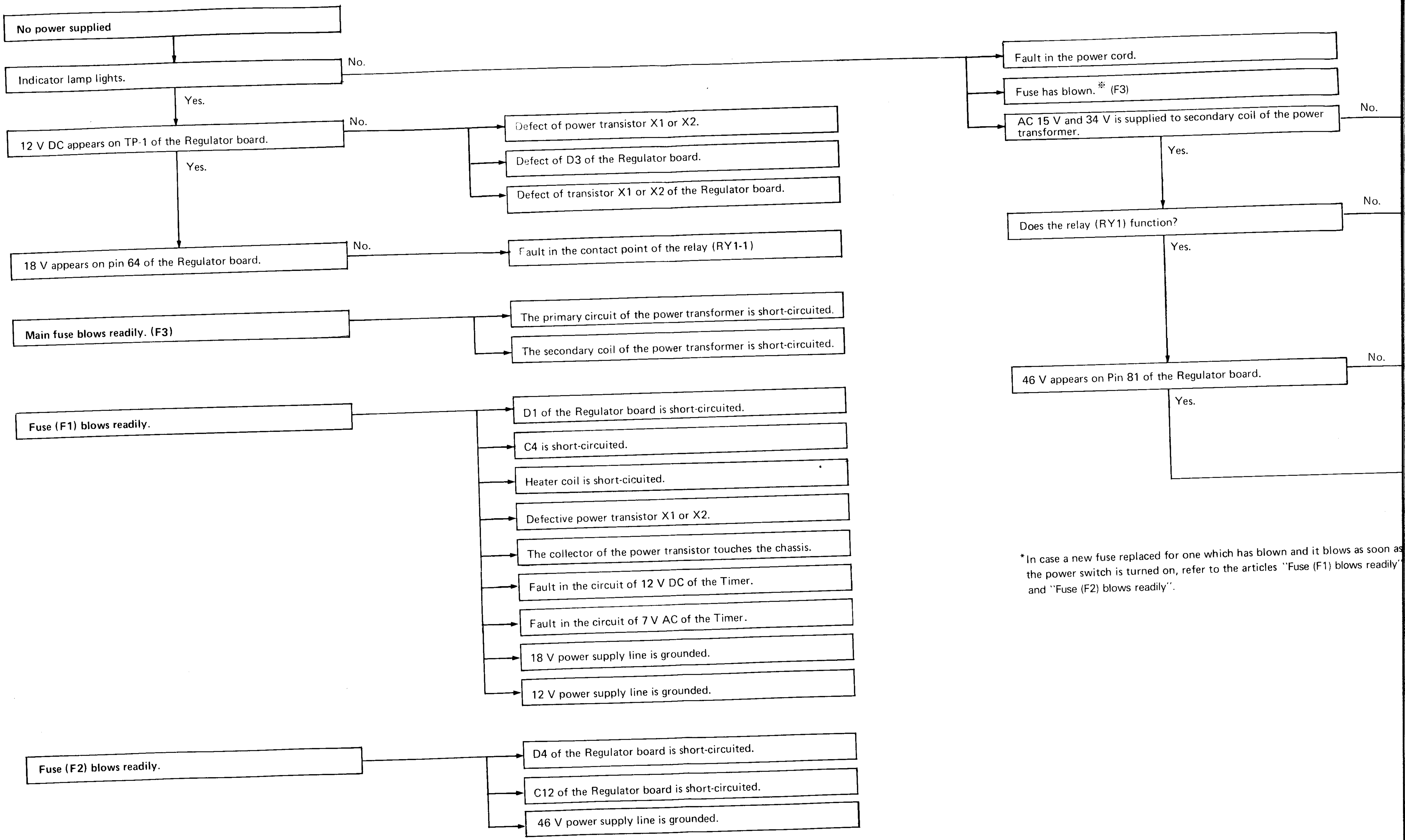
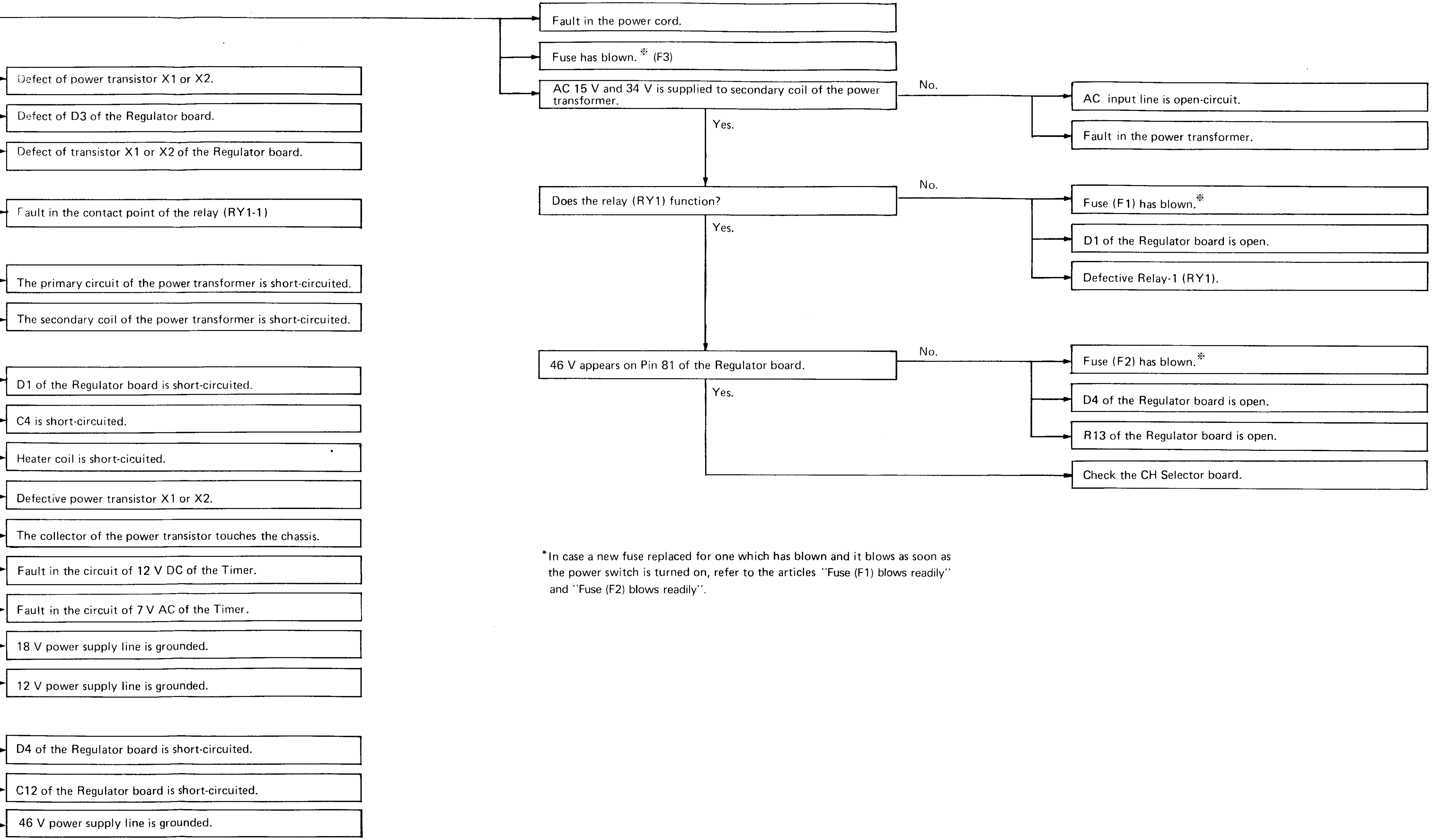
What may appear at first to be trouble is not always a real problem. Before repairing make sure first by following the troubleshooting procedure below:

1. Unit power not present.
   - Is the unit power cord disconnected?
   - Is the function switch set to TIMER? Set to ON position.
2. Playback picture does not appear while the tape is running.
   - Is the TV channel selector set to an unoccupied channel?
   - Is the VIDEO/TV switch set to TV position? Set to VIDEO position.
3. The tape does not run in the Recording mode or picture does not appear in the Playback mode.
   - Is the PAUSE key depressed? Depress again to release.
4. The REC or AUDIO DUB key cannot be depressed.
   - Is the cassette properly loaded in the compartment?
   - Is the safety tab of the video cassette broken?
5. The tape stops in the Rewind mode.
   - Is the SEARCH button on?
6. Playback picture is partially noisy.
   - Is the TRACKING control knob properly adjusted? Turn until you hear the clicking sound. If the noise is still present, turn slowly until the picture clears.
7. Tape will not rewind or fast-forward.
   - Is the tape already rewound or fast-forwarded to the end?
8. Noise such as whistling or howling is heard from the TV.
   - Is the microphone located near the TV? Keep the microphone away from the TV or reduce the TV volume.
9. TV broadcasts cannot be recorded.
   - Is the REC SELECT switch set to TV?
10. Playback picture is different from that recorded.
    - Is the microphone plugged in? Unplug the microphone.

8-1 REGULATOR CIRCUIT


No power supplied
Indicator lamp lights.
No.
Yes.
12 V DC appears on TP-1 of the Regulator board.
No.
Yes.
18 V appears on pin 64 of the Regulator board.
No.
Main fuse blows readily. (F3)
Fuse (F1) blows readily.
Fuse (F2) blows readily.
Fault in the power cord.
Fuse has blown. * (F3)
AC 15 V and 34 V is supplied to secondary coil of the power transformer.
No.
Yes.
Does the relay (RY1) function?
No.
Yes.
46 V appears on Pin 81 of the Regulator board.
No.
Yes.
Defect of power transistor X1 or X2.
Defect of D3 of the Regulator board.
Defect of transistor X1 or X2 of the Regulator board.
Fault in the contact point of the relay (RY1-1)
The primary circuit of the power transformer is short-circuited.
The secondary coil of the power transformer is short-circuited.
D1 of the Regulator board is short-circuited.
C4 is short-circuited.
Heater coil is short-cicuited.
Defective power transistor X1 or X2.
The collector of the power transistor touches the chassis.
Fault in the circuit of 12 V DC of the Timer.
Fault in the circuit of 7 V AC of the Timer.
18 V power supply line is grounded.
12 V power supply line is grounded.
D4 of the Regulator board is short-circuited.
C12 of the Regulator board is short-circuited.
46 V power supply line is grounded.

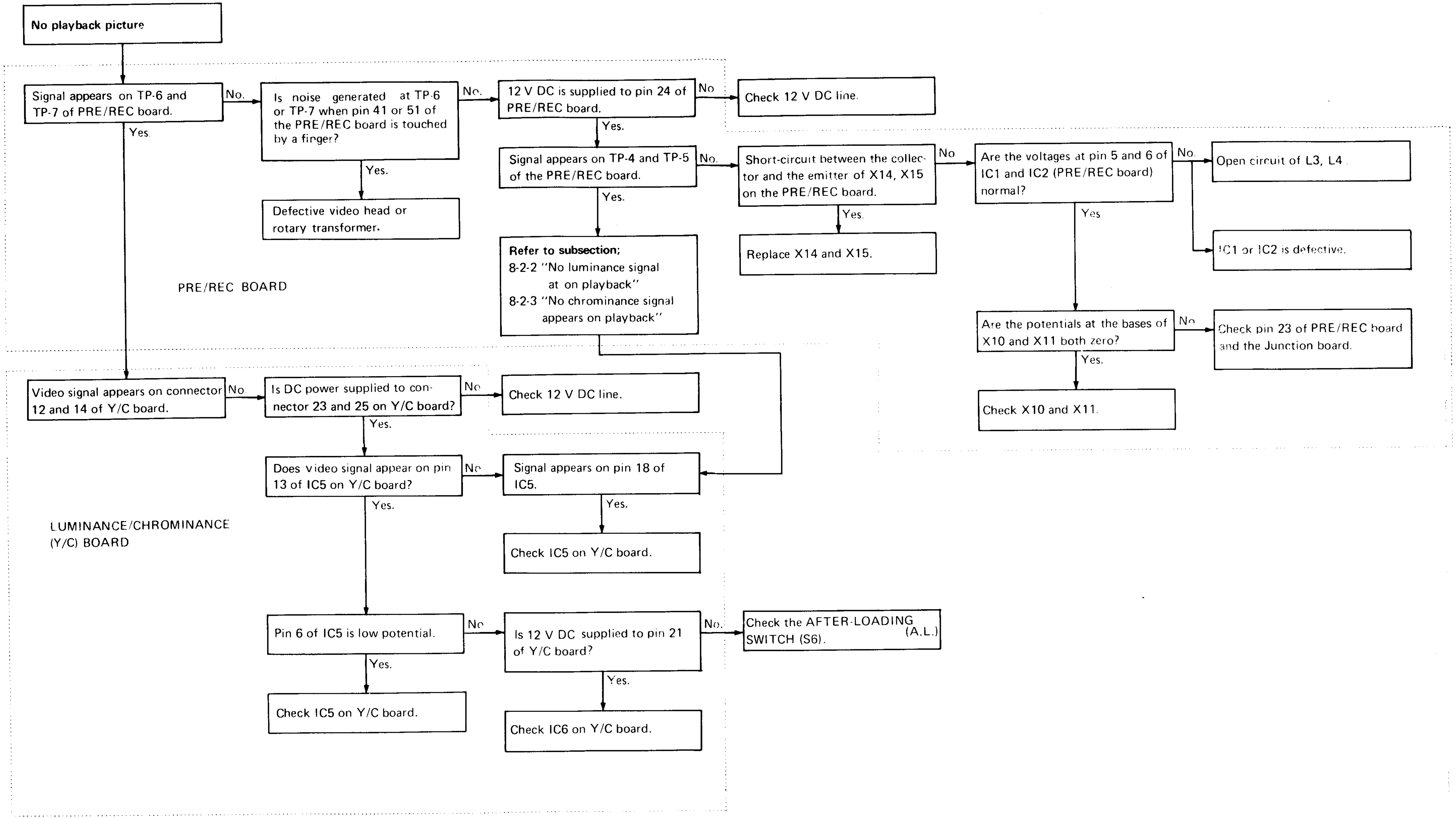
*In case a new fuse replaced for one which has blown and it blows as soon as the power switch is turned on, refer to the articles "Fuse (F1) blows readily" and "Fuse (F2) blows readily".


Defect of power transistor X1 or X2.
Defect of D3 of the Regulator board.
Defect of transistor X1 or X2 of the Regulator board.
Fault in the contact point of the relay (RY1-1)
The primary circuit of the power transformer is short-circuited.
The secondary coil of the power transformer is short-circuited.
D1 of the Regulator board is short-circuited.
C4 is short-circuited.
Heater coil is short-cicuited.
Defective power transistor X1 or X2.
The collector of the power transistor touches the chassis.
Fault in the circuit of 12 V DC of the Timer.
Fault in the circuit of 7 V AC of the Timer.
18 V power supply line is grounded.
12 V power supply line is grounded.
D4 of the Regulator board is short-circuited.
C12 of the Regulator board is short-circuited.
46 V power supply line is grounded.
Fault in the power cord.
Fuse has blown.※ (F3)
AC 15 V and 34 V is supplied to secondary coil of the power transformer.
No.
AC input line is open-circuit.
Fault in the power transformer.
Yes.
Does the relay (RY1) function?
No.
Fuse (F1) has blown.※
D1 of the Regulator board is open.
Defective Relay-1 (RY1).
Yes.
46 V appears on Pin 81 of the Regulator board.
No.
Fuse (F2) has blown.※
D4 of the Regulator board is open.
R13 of the Regulator board is open.
Yes.
Check the CH Selector board.

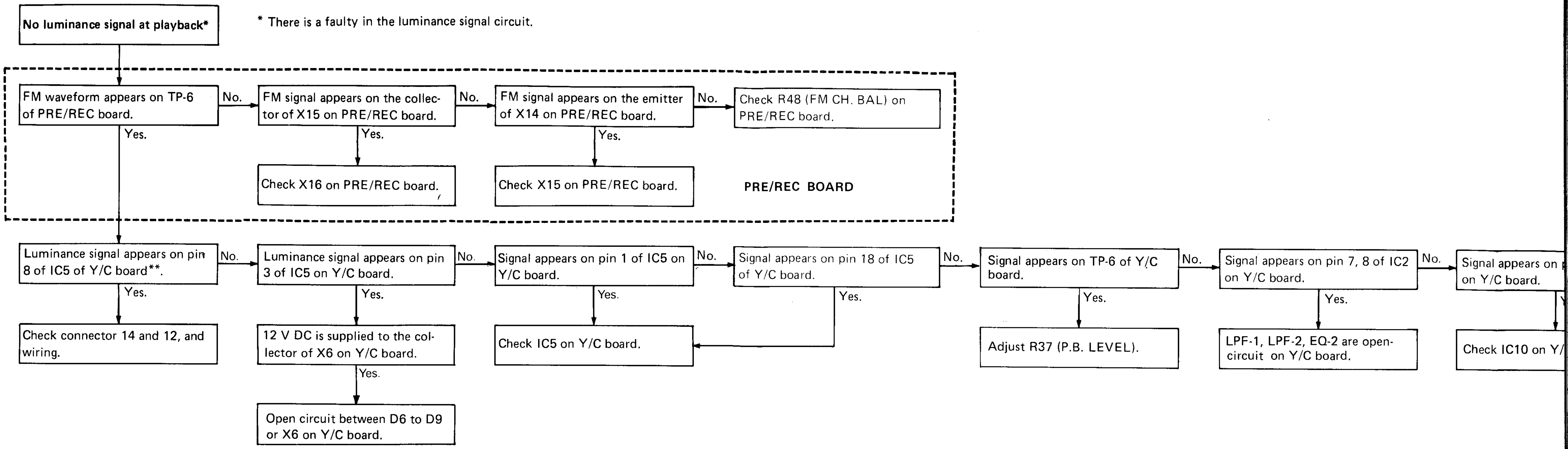
*In case a new fuse replaced for one which has blown and it blows as soon as the power switch is turned on, refer to the articles "Fuse (F1) blows readily" and "Fuse (F2) blows readily".

8-2 VIDEO SIGNAL PLAYBACK SYSTEM

8-2-1 Playback with alignment tape

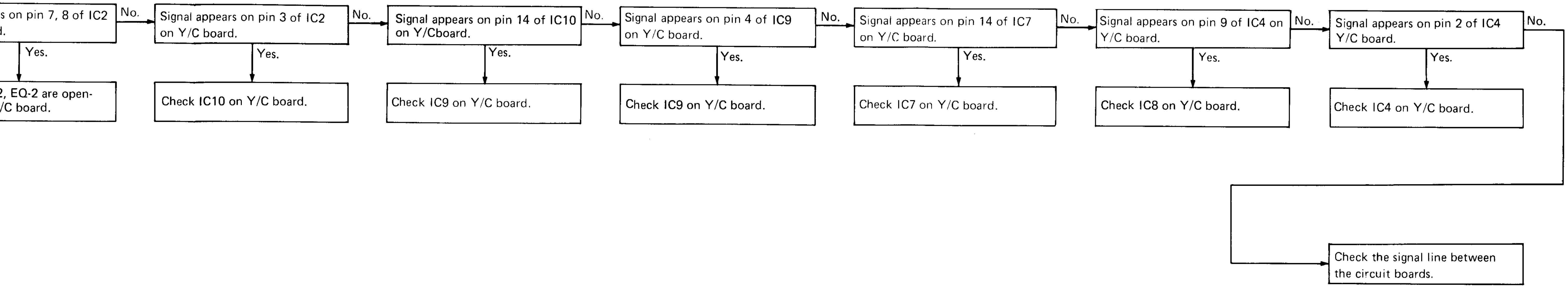

No playback picture
Signal appears on TP-6 and TP-7 of PRE/REC board.
No.
Is noise generated at TP-6 or TP-7 when pin 41 or 51 of the PRE/REC board is touched by a finger?
No.
12 V DC is supplied to pin 24 of PRE/REC board.
No
Check 12 V DC line.
Yes.
Yes.
Yes.
Defective video head or rotary transformer.
Signal appears on TP-4 and TP-5 of the PRE/REC board.
No.
Short-circuit between the collector and the emitter of X14, X15 on the PRE/REC board.
No
Are the voltages at pin 5 and 6 of IC1 and IC2 (PRE/REC board) normal?
No.
Open circuit of L3, L4.
IC1 or IC2 is defective.
Yes.
Yes.
Replace X14 and X15.
Yes
Refer to subsection;
8-2-2 "No luminance signal at on playback"
8-2-3 "No chrominance signal appears on playback"
PRE/REC BOARD
Are the potentials at the bases of X10 and X11 both zero?
No
Check pin 23 of PRE/REC board and the Junction board.
Yes.
Check X10 and X11.
Video signal appears on connector 12 and 14 of Y/C board.
No
Is DC power supplied to connector 23 and 25 on Y/C board?
No
Check 12 V DC line.
Yes.
Does video signal appear on pin 13 of IC5 on Y/C board?
No
Signal appears on pin 18 of IC5.
Yes.
Yes.
LUMINANCE/CHROMINANCE (Y/C) BOARD
Check IC5 on Y/C board.
Pin 6 of IC5 is low potential.
No
Is 12 V DC supplied to pin 21 of Y/C board?
No.
Check the AFTER-LOADING (A.L.) SWITCH (S6).
Yes.
Yes.
Check IC5 on Y/C board.
Check IC6 on Y/C board.

8-2-2 No luminance signal at playback

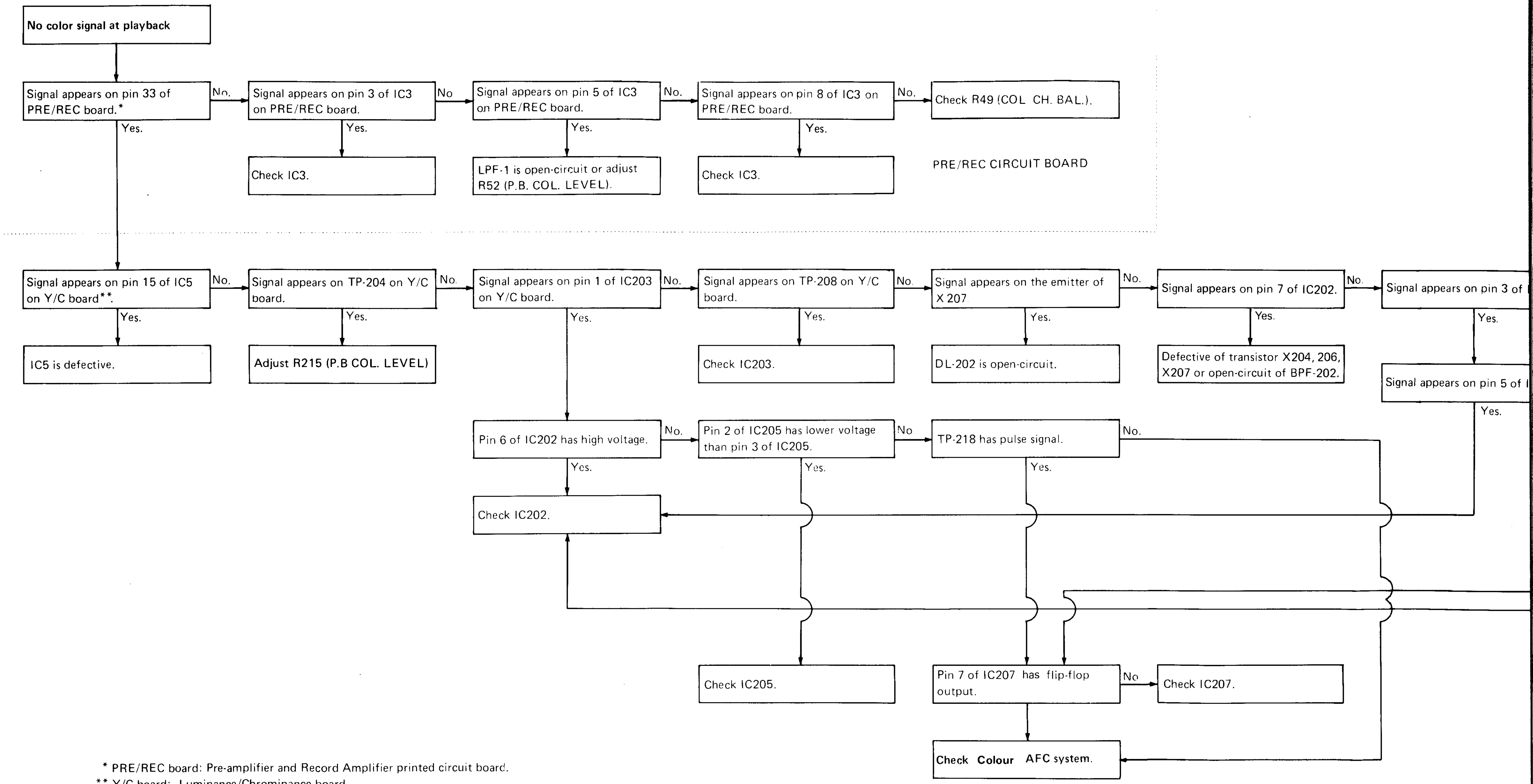

No luminance signal at playback*
FM waveform appears on TP-6 of PRE/REC board.
No.
FM signal appears on the collector of X15 on PRE/REC board.
No.
FM signal appears on the emitter of X14 on PRE/REC board.
No.
Check R48 (FM CH. BAL) on PRE/REC board.
Yes.
Yes.
Yes.
Check X16 on PRE/REC board.
Check X15 on PRE/REC board.
PRE/REC BOARD
Luminance signal appears on pin 8 of IC5 of Y/C board**.
No.
Luminance signal appears on pin 3 of IC5 on Y/C board.
No.
Signal appears on pin 1 of IC5 on Y/C board.
No.
Signal appears on pin 18 of IC5 of Y/C board.
No.
Signal appears on TP-6 of Y/C board.
No.
Signal appears on pin 7, 8 of IC2 on Y/C board.
No.
Signal appears on
on Y/C board.
Yes.
Yes.
Yes.
Yes.
Yes.
Yes.
Check connector 14 and 12, and wiring.
12 V DC is supplied to the collector of X6 on Y/C board.
Check IC5 on Y/C board.
Adjust R37 (P.B. LEVEL).
LPF-1, LPF-2, EQ-2 are open-circuit on Y/C board.
Check IC10 on Y/
Yes.
Open circuit between D6 to D9 or X6 on Y/C board.

* There is a faulty in the luminance signal circuit.

** Y/C board: Luminance/Chrominance board.

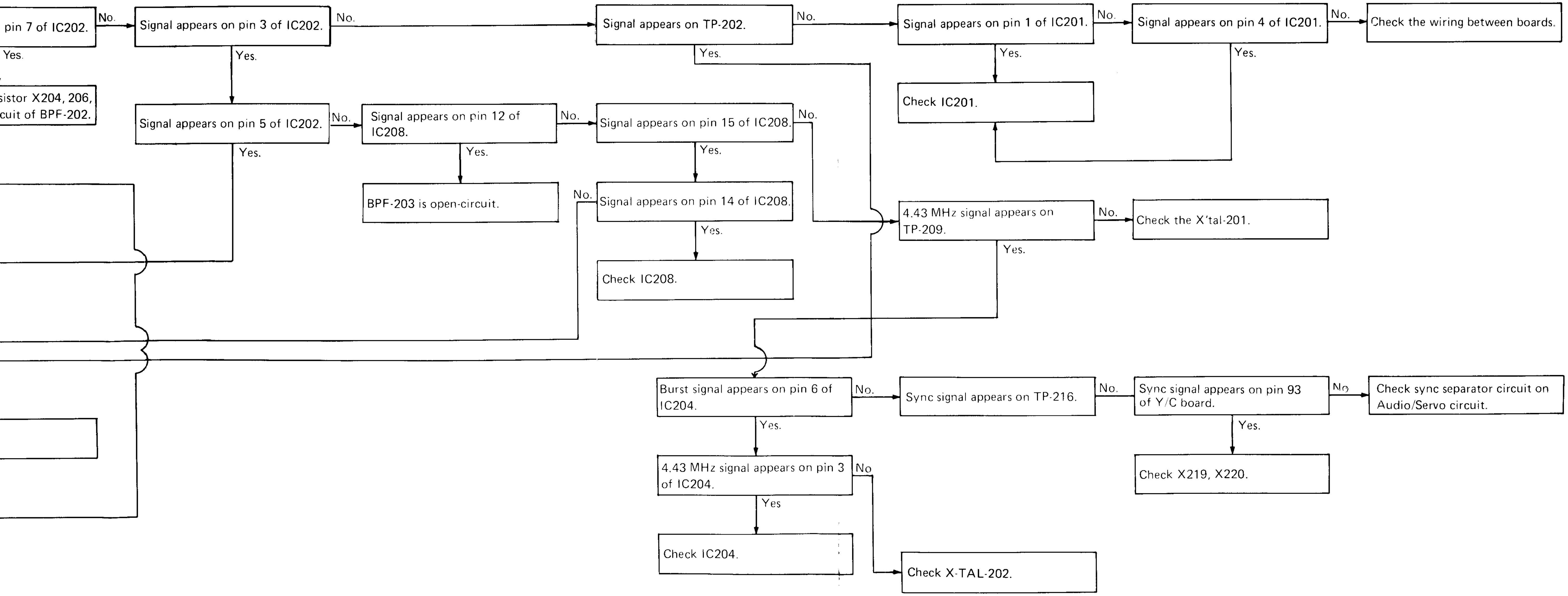

s on pin 7, 8 of IC2
l.
No.
Yes.
2, EQ-2 are open-
/C board.
Signal appears on pin 3 of IC2 on Y/C board.
No.
Yes.
Check IC10 on Y/C board.
Signal appears on pin 14 of IC10 on Y/Cboard.
No.
Yes.
Check IC9 on Y/C board.
Signal appears on pin 4 of IC9 on Y/C board.
No.
Yes.
Check IC9 on Y/C board.
Signal appears on pin 14 of IC7 on Y/C board.
No.
Yes.
Check IC7 on Y/C board.
Signal appears on pin 9 of IC4 on Y/C board.
No.
Yes.
Check IC8 on Y/C board.
Signal appears on pin 2 of IC4 Y/C board.
No.
Yes.
Check IC4 on Y/C board.
Check the signal line between the circuit boards.

8-2-3 No color signal on playback


No color signal at playback
Signal appears on pin 33 of PRE/REC board.*
No.
Yes.
Signal appears on pin 3 of IC3 on PRE/REC board.
No
Yes.
Check IC3.
Signal appears on pin 5 of IC3 on PRE/REC board.
No.
Yes.
LPF-1 is open-circuit or adjust R52 (P.B. COL. LEVEL).
Signal appears on pin 8 of IC3 on PRE/REC board.
No.
Yes.
Check IC3.
Check R49 (COL CH. BAL.).
PRE/REC CIRCUIT BOARD
Signal appears on pin 15 of IC5 on Y/C board**.
No.
Yes.
IC5 is defective.
Signal appears on TP-204 on Y/C board.
No
Yes.
Adjust R215 (P.B COL. LEVEL)
Signal appears on pin 1 of IC203 on Y/C board.
No.
Yes.
Signal appears on TP-208 on Y/C board.
No.
Yes.
Check IC203.
Signal appears on the emitter of X 207
No.
Yes.
DL-202 is open-circuit.
Signal appears on pin 7 of IC202.
No.
Yes.
Defective of transistor X204, 206, X207 or open-circuit of BPF-202.
Signal appears on pin 3 of I
Yes.
Signal appears on pin 5 of I
Yes.
Pin 6 of IC202 has high voltage.
No.
Yes.
Pin 2 of IC205 has lower voltage than pin 3 of IC205.
No
Yes.
TP-218 has pulse signal.
No.
Yes.
Check IC202.
Check IC205.
Pin 7 of IC207 has flip-flop output.
No
Check IC207.
Check Colour AFC system.

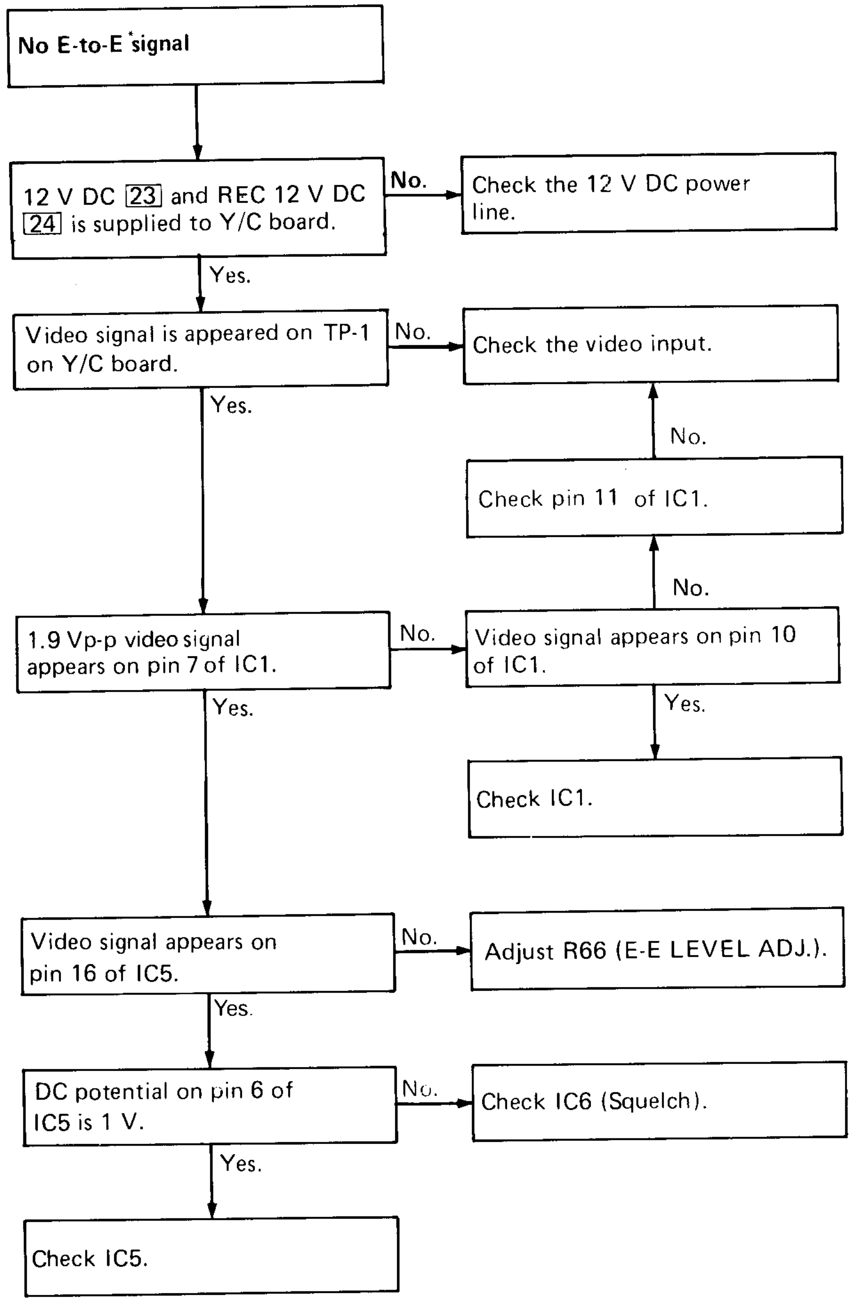
* PRE/REC board: Pre-amplifier and Record Amplifier printed circuit board.

** Y/C board: Luminance/Chrominance board.


pin 7 of IC202.
No.
Yes.
sistor X204, 206,
cuit of BPF-202.
Signal appears on pin 3 of IC202.
No.
Yes.
Signal appears on pin 5 of IC202.
No.
Yes.
Signal appears on pin 12 of IC208.
No.
Yes.
BPF-203 is open-circuit.
Signal appears on TP-202.
No.
Yes.
Signal appears on pin 15 of IC208.
No.
Yes.
No.
Signal appears on pin 14 of IC208.
Yes.
Check IC208.
Signal appears on pin 1 of IC201.
No.
Yes.
Check IC201.
Signal appears on pin 4 of IC201.
No.
Yes.
Check the wiring between boards.
4.43 MHz signal appears on TP-209.
No.
Yes.
Check the X'tal-201.
Burst signal appears on pin 6 of IC204.
No.
Yes.
Sync signal appears on TP-216.
No.
Sync signal appears on pin 93 of Y/C board.
No
Yes.
Check sync separator circuit on Audio/Servo circuit.
Check X219, X220.
4.43 MHz signal appears on pin 3 of IC204.
No
Yes
Check IC204.
Check X-TAL-202.

8-3 VIDEO RECORDING SYSTEM

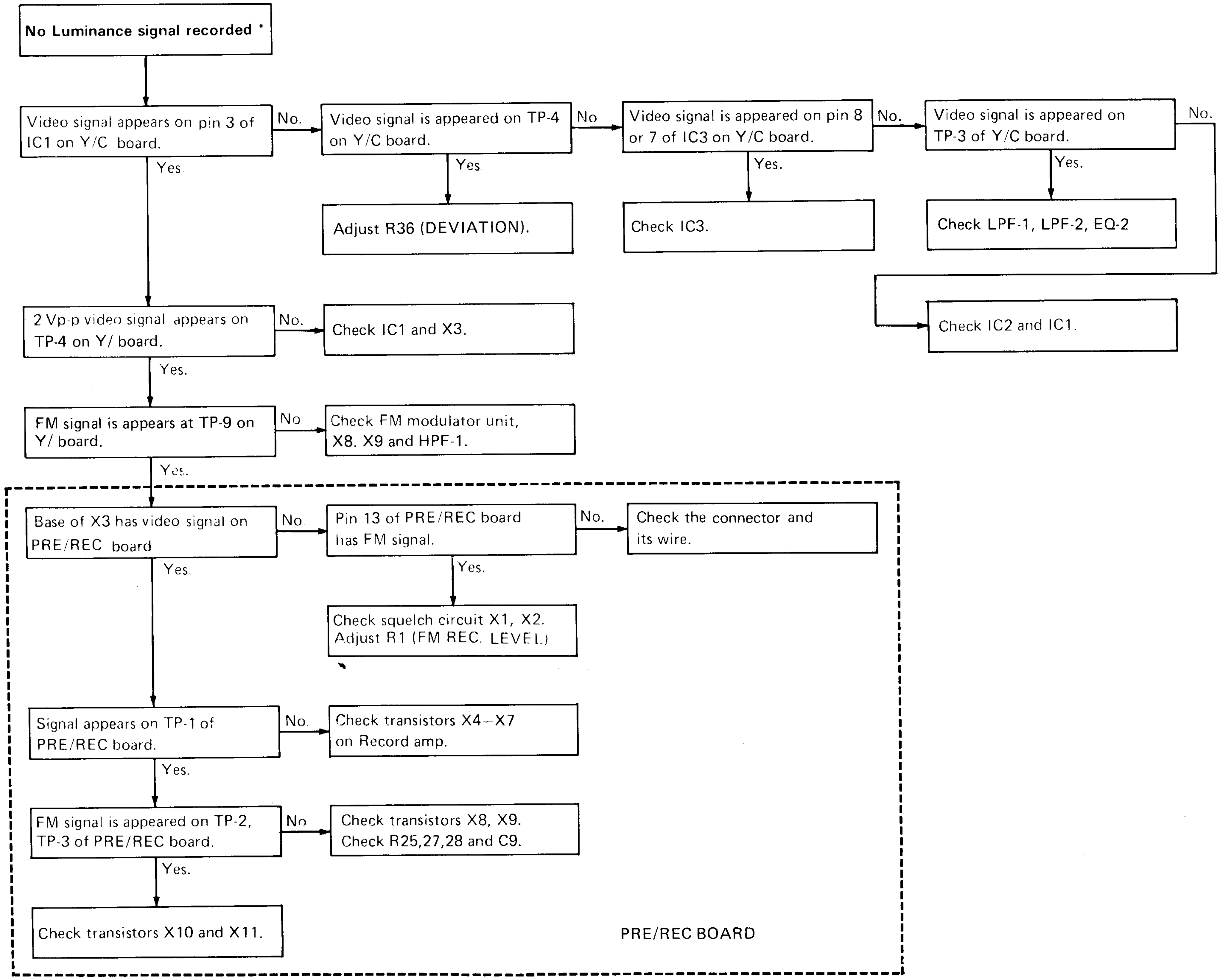
8-3-1 E-to-E signal line


No E-to-E signal
12 V DC 23 and REC 12 V DC 24 is supplied to Y/C board.
No.
Check the 12 V DC power line.
Yes.
Video signal is appeared on TP-1 on Y/C board.
No.
Check the video input.
Yes.
No.
Check pin 11 of IC1.
No.
1.9 Vp-p video signal appears on pin 7 of IC1.
No.
Video signal appears on pin 10 of IC1.
Yes.
Yes.
Check IC1.
Video signal appears on pin 16 of IC5.
No.
Adjust R66 (E-E LEVEL ADJ.).
Yes.
DC potential on pin 6 of IC5 is 1 V.
No.
Check IC6 (Squelch).
Yes.
Check IC5.

NOTE: Presupposing that all the circuits used in common with the playback system are normal.

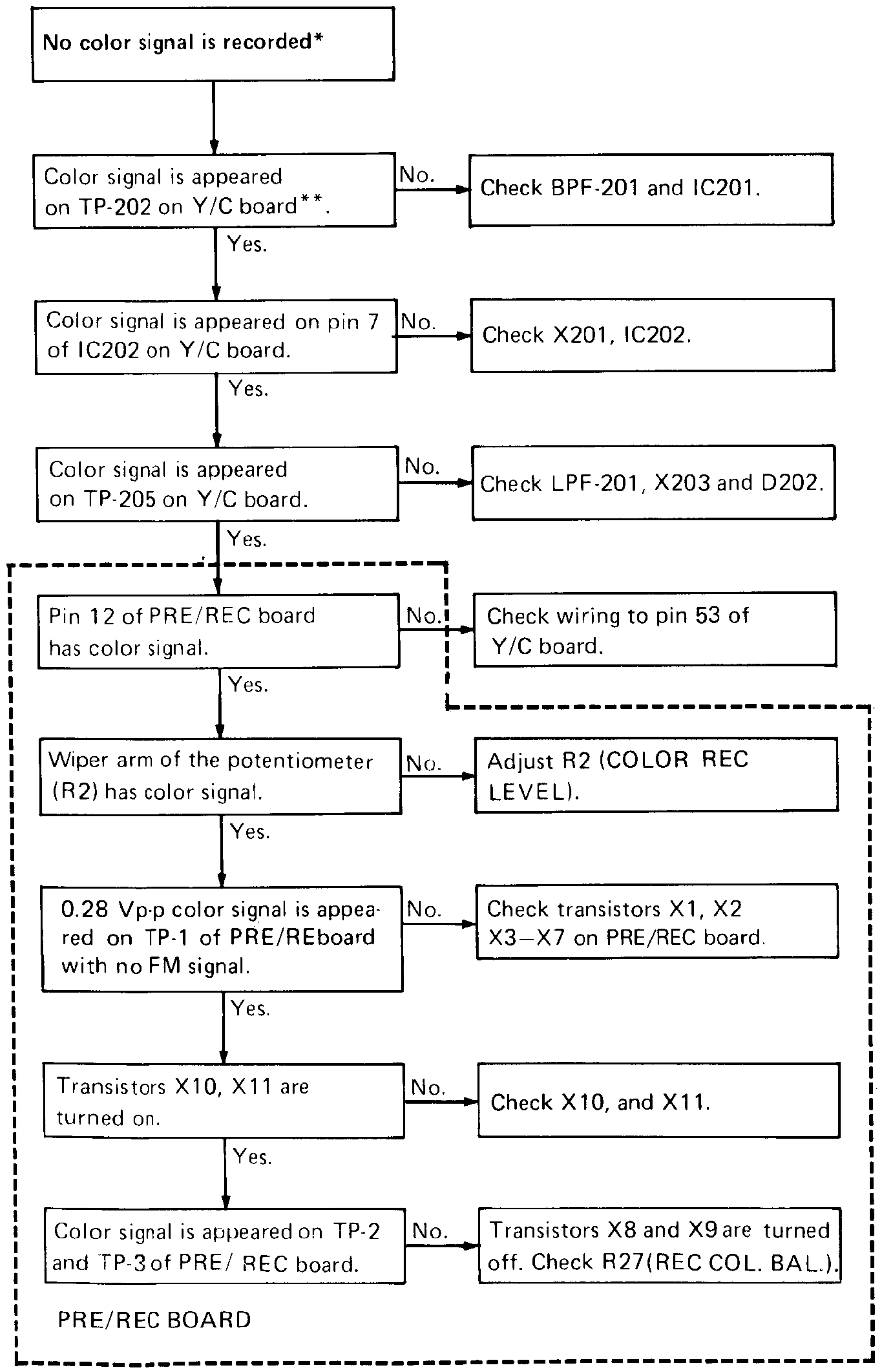
* E to E : Electronic to Electronic.

8-3-2 Luminance signal — No record


No Luminance signal recorded *
Video signal appears on pin 3 of IC1 on Y/C board.
No.
Video signal is appeared on TP-4 on Y/C board.
No
Video signal is appeared on pin 8 or 7 of IC3 on Y/C board.
No.
Video signal is appeared on TP-3 of Y/C board.
No.
Yes
Yes
Yes.
Yes.
Adjust R36 (DEVIATION).
Check IC3.
Check LPF-1, LPF-2, EQ-2
Check IC2 and IC1.
2 Vp-p video signal appears on TP-4 on Y/ board.
No.
Check IC1 and X3.
Yes.
FM signal is appears at TP-9 on Y/ board.
No
Check FM modulator unit, X8. X9 and HPF-1.
Yes.
Base of X3 has video signal on PRE/REC board
No.
Pin 13 of PRE/REC board has FM signal.
No.
Check the connector and its wire.
Yes.
Yes.
Check squelch circuit X1, X2. Adjust R1 (FM REC. LEVEL)
Signal appears on TP-1 of PRE/REC board.
No.
Check transistors X4–X7 on Record amp.
Yes.
FM signal is appeared on TP-2, TP-3 of PRE/REC board.
No
Check transistors X8, X9. Check R25,27,28 and C9.
Yes.
Check transistors X10 and X11.
PRE/REC BOARD

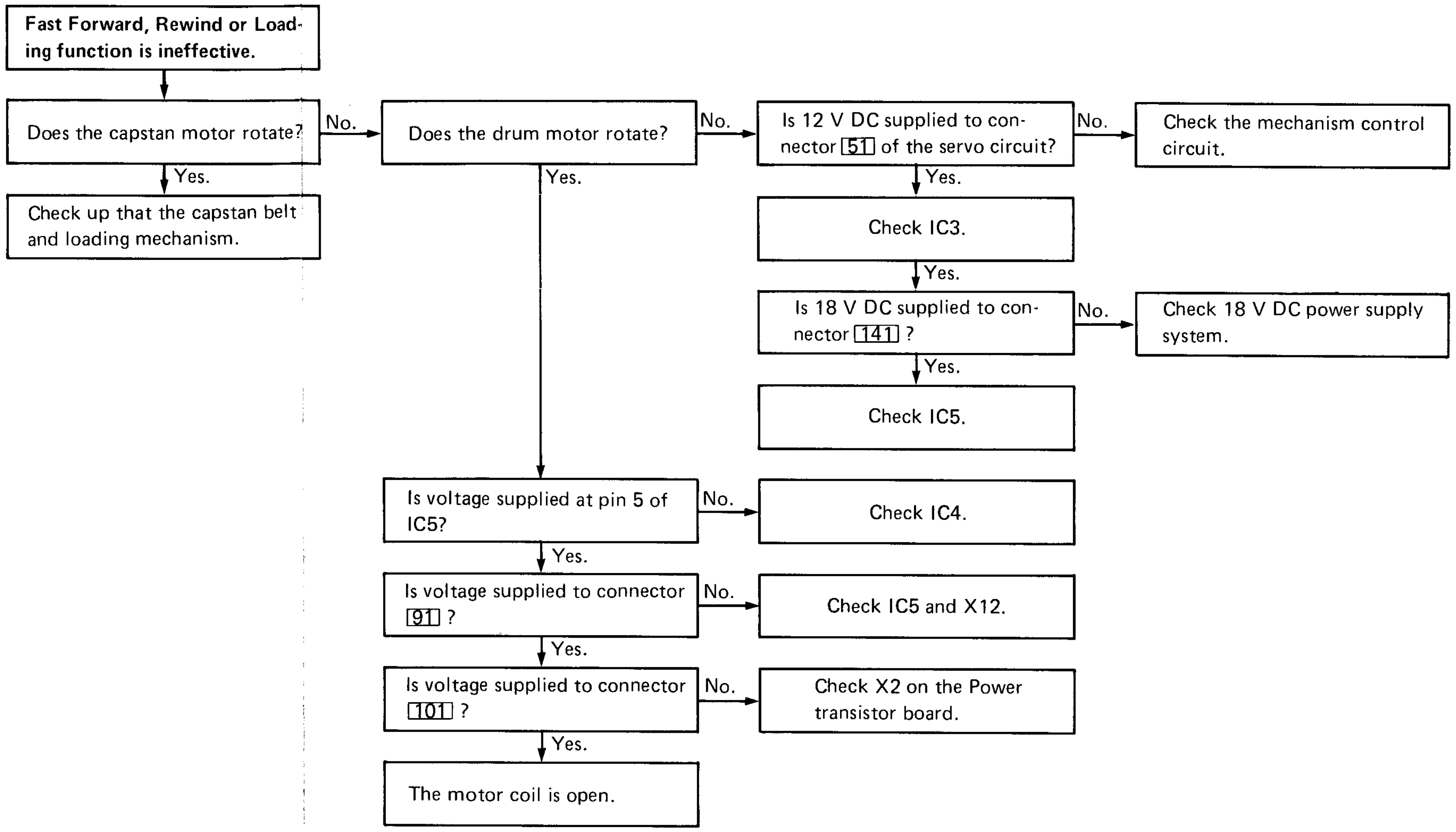
*The following excludes the circuit of E-to-E system.
**Y/C : Luminance and color printed circuit board.

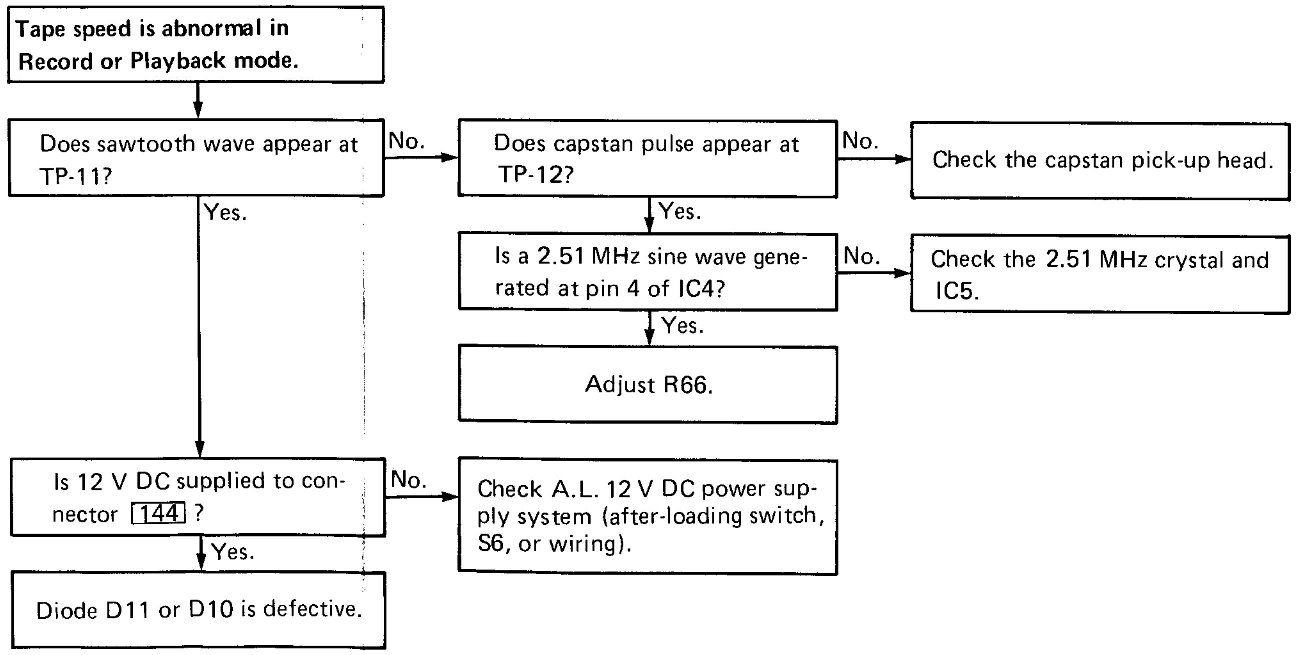
8-3-3 Color signal — No record


No color signal is recorded*
Color signal is appeared on TP-202 on Y/C board**.
No.
Check BPF-201 and IC201.
Yes.
Color signal is appeared on pin 7 of IC202 on Y/C board.
No.
Check X201, IC202.
Yes.
Color signal is appeared on TP-205 on Y/C board.
No.
Check LPF-201, X203 and D202.
Yes.
Pin 12 of PRE/REC board has color signal.
No.
Check wiring to pin 53 of Y/C board.
Yes.
Wiper arm of the potentiometer (R2) has color signal.
No.
Adjust R2 (COLOR REC LEVEL).
Yes.
0.28 Vp-p color signal is appeared on TP-1 of PRE/REboard with no FM signal.
No.
Check transistors X1, X2 X3—X7 on PRE/REC board.
Yes.
Transistors X10, X11 are turned on.
No.
Check X10, and X11.
Yes.
Color signal is appeared on TP-2 and TP-3 of PRE/ REC board.
No.
Transistors X8 and X9 are turned off. Check R27(REC COL. BAL.).
PRE/REC BOARD

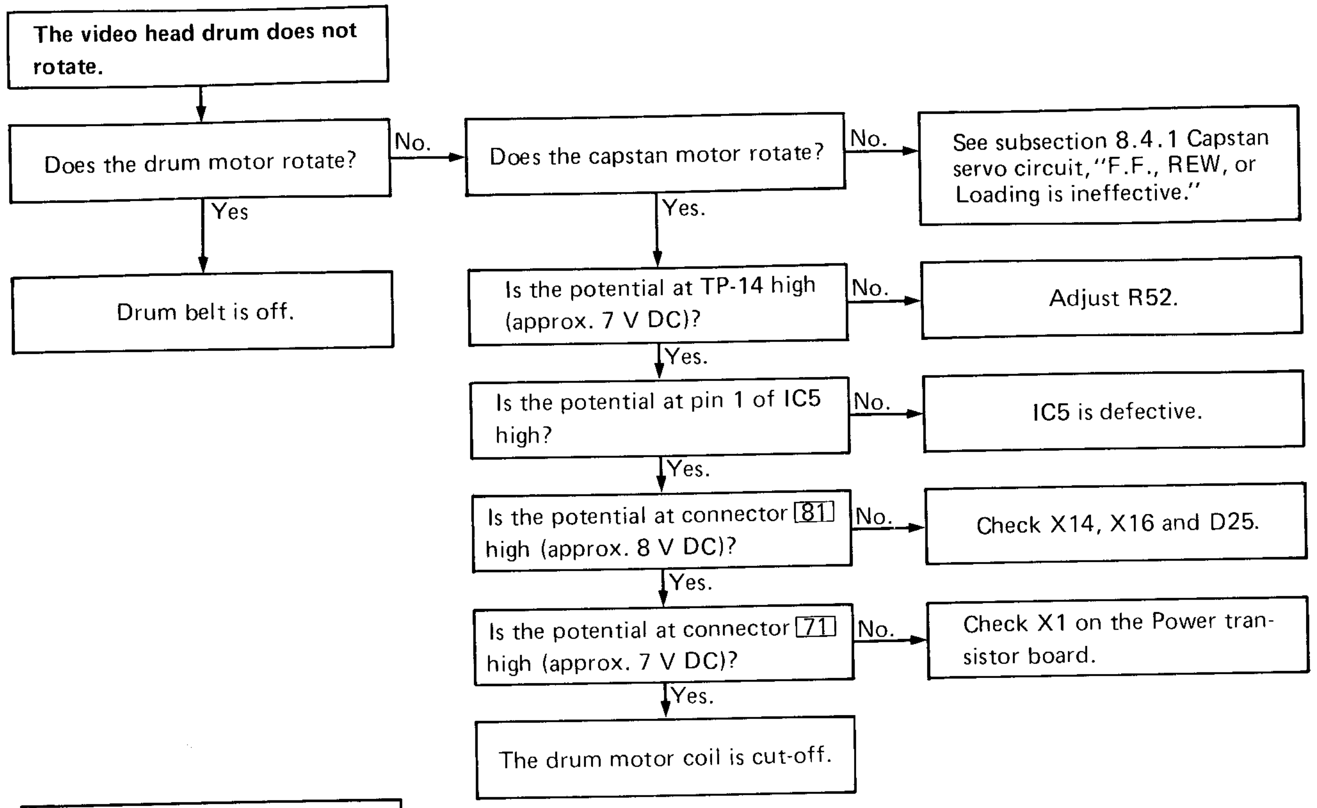
8.4 SERVO CIRCUIT

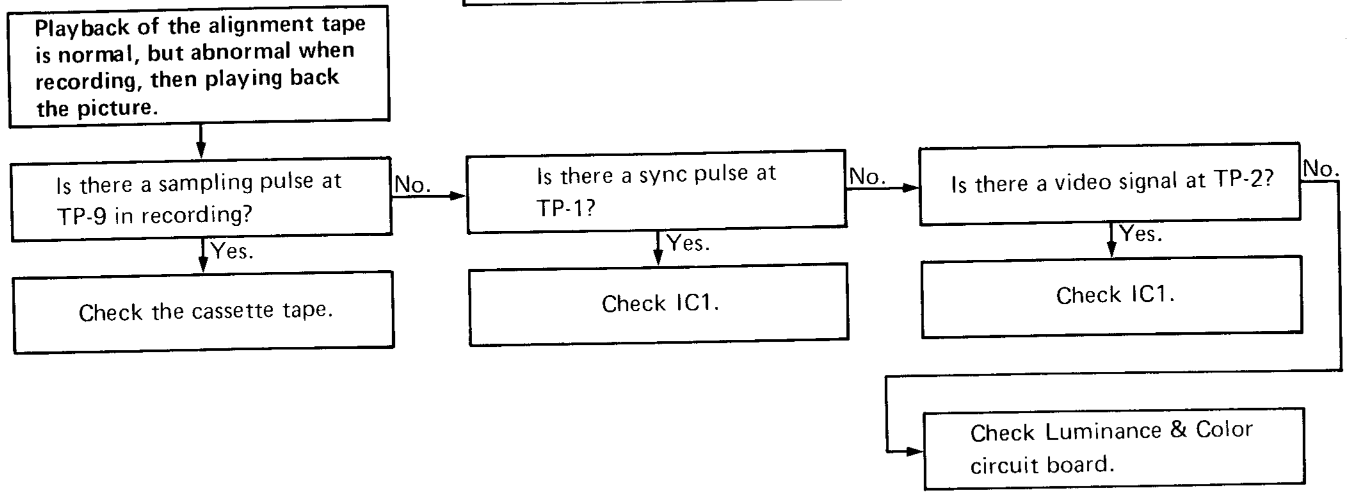
8.4.1 Capstan servo circuit

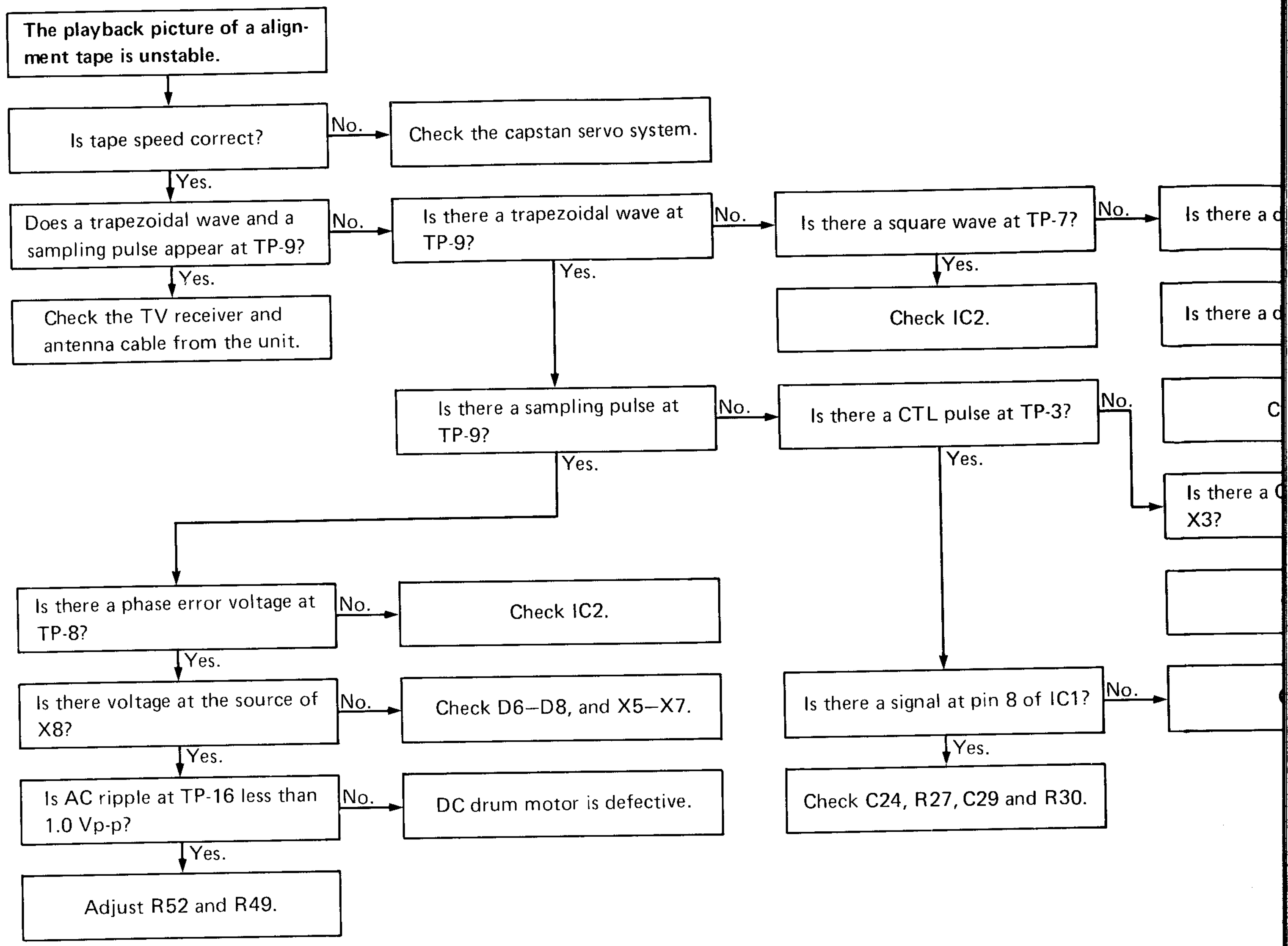

Fast Forward, Rewind or Loading function is ineffective.
Does the capstan motor rotate?
No.
Yes.
Check up that the capstan belt and loading mechanism.
Does the drum motor rotate?
No.
Yes.
Is 12 V DC supplied to connector 51 of the servo circuit?
No.
Check the mechanism control circuit.
Yes.
Check IC3.
Yes.
Is 18 V DC supplied to connector 141 ?
No.
Check 18 V DC power supply system.
Yes.
Check IC5.
Is voltage supplied at pin 5 of IC5?
No.
Check IC4.
Yes.
Is voltage supplied to connector 91 ?
No.
Check IC5 and X12.
Yes.
Is voltage supplied to connector 101 ?
No.
Check X2 on the Power transistor board.
Yes.
The motor coil is open.

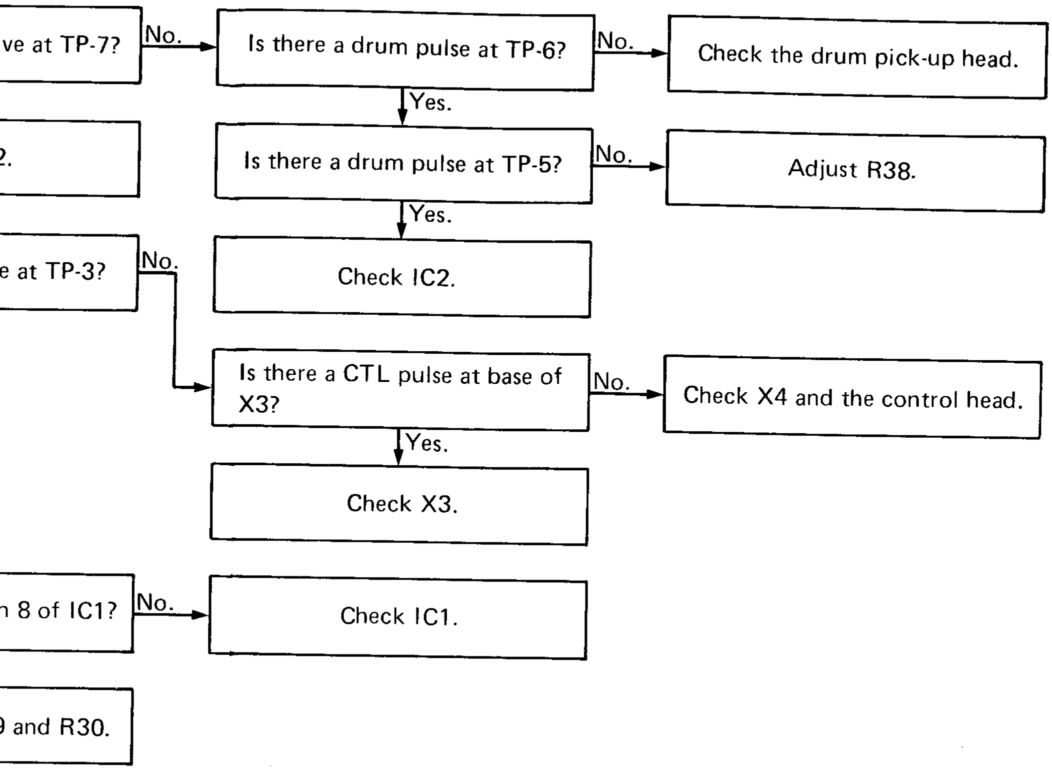

Tape speed is abnormal in Record or Playback mode.
Does sawtooth wave appear at TP-11?
No.
Yes.
Does capstan pulse appear at TP-12?
No.
Check the capstan pick-up head.
Yes.
Is a 2.51 MHz sine wave generated at pin 4 of IC4?
No.
Check the 2.51 MHz crystal and IC5.
Yes.
Adjust R66.
Is 12 V DC supplied to connector 144 ?
No.
Check A.L. 12 V DC power supply system (after-loading switch, S6, or wiring).
Yes.
Diode D11 or D10 is defective.

8.4.2 Drum servo circuit


The video head drum does not rotate.
Does the drum motor rotate?
No.
Yes
Drum belt is off.
Does the capstan motor rotate?
No.
See subsection 8.4.1 Capstan servo circuit, "F.F., REW, or Loading is ineffective."
Yes.
Is the potential at TP-14 high (approx. 7 V DC)?
No.
Adjust R52.
Yes.
Is the potential at pin 1 of IC5 high?
No.
IC5 is defective.
Yes.
Is the potential at connector 81 high (approx. 8 V DC)?
No.
Check X14, X16 and D25.
Yes.
Is the potential at connector 71 high (approx. 7 V DC)?
No.
Check X1 on the Power transistor board.
Yes.
The drum motor coil is cut-off.

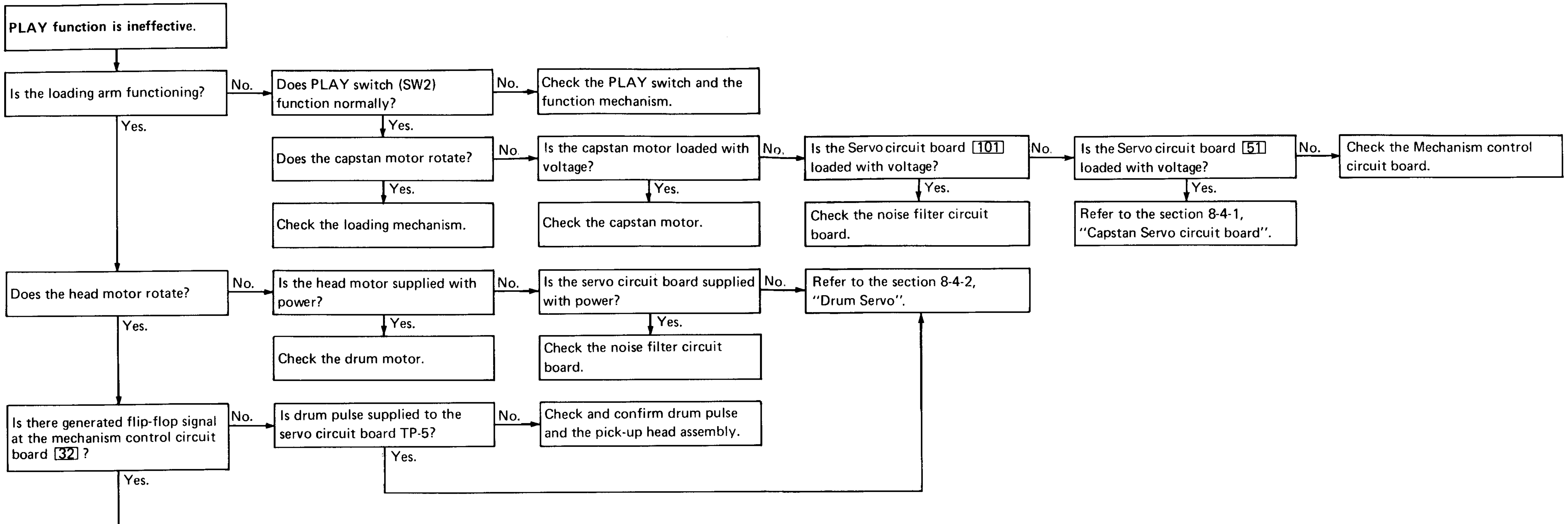

Playback of the alignment tape is normal, but abnormal when recording, then playing back the picture.
Is there a sampling pulse at TP-9 in recording?
No.
Yes.
Check the cassette tape.
Is there a sync pulse at TP-1?
No.
Yes.
Check IC1.
Is there a video signal at TP-2?
No.
Yes.
Check IC1.
Check Luminance & Color circuit board.

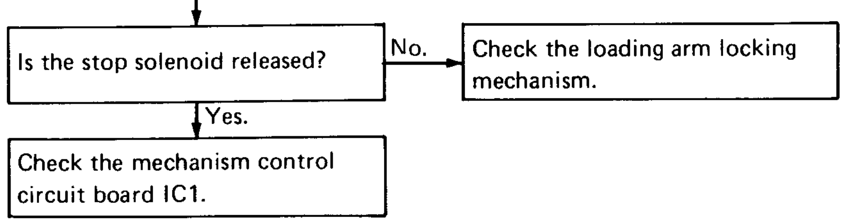

The playback picture of a alignment tape is unstable.
Is tape speed correct?
No.
Check the capstan servo system.
Yes.
Does a trapezoidal wave and a sampling pulse appear at TP-9?
No.
Yes.
Check the TV receiver and antenna cable from the unit.
Is there a trapezoidal wave at TP-9?
No.
Yes.
Is there a square wave at TP-7?
No.
Yes.
Check IC2.
Is there a c
Is there a c
C
Is there a sampling pulse at TP-9?
No.
Yes.
Is there a CTL pulse at TP-3?
No.
Yes.
Is there a C X3?
Is there a signal at pin 8 of IC1?
No.
Yes.
Check C24, R27, C29 and R30.
Is there a phase error voltage at TP-8?
No.
Check IC2.
Yes.
Is there voltage at the source of X8?
No.
Check D6–D8, and X5–X7.
Yes.
Is AC ripple at TP-16 less than 1.0 Vp-p?
No.
DC drum motor is defective.
Yes.
Adjust R52 and R49.


ve at TP-7?
No.
Is there a drum pulse at TP-6?
No.
Check the drum pick-up head.
Yes.
2.
Is there a drum pulse at TP-5?
No.
Adjust R38.
Yes.
e at TP-3?
No.
Check IC2.
Is there a CTL pulse at base of X3?
No.
Check X4 and the control head.
Yes.
Check X3.
n 8 of IC1?
No.
Check IC1.
9 and R30.

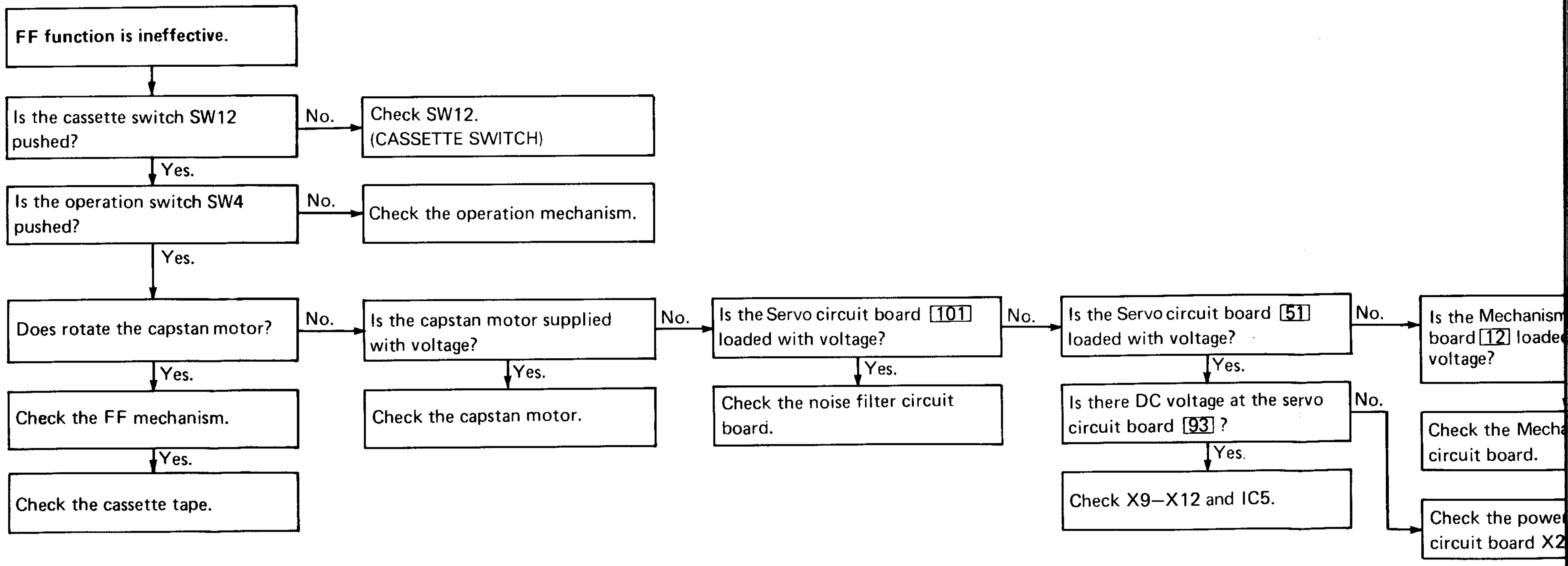
8-5 TROUBLESHOOTING OF MECHANISM AND MECHANISM CONTROLS

8-5-1 PLAY function is ineffective

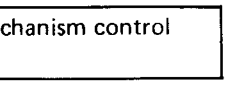

PLAY function is ineffective.
Is the loading arm functioning?
No.
Does PLAY switch (SW2) function normally?
No.
Check the PLAY switch and the function mechanism.
Yes.
Yes.
Does the capstan motor rotate?
No.
Is the capstan motor loaded with voltage?
No.
Is the Servo circuit board 101 loaded with voltage?
No.
Is the Servo circuit board 51 loaded with voltage?
No.
Check the Mechanism control circuit board.
Yes.
Check the loading mechanism.
Yes.
Check the capstan motor.
Yes.
Check the noise filter circuit board.
Yes.
Refer to the section 8-4-1, "Capstan Servo circuit board".
Does the head motor rotate?
No.
Is the head motor supplied with power?
No.
Is the servo circuit board supplied with power?
No.
Refer to the section 8-4-2, "Drum Servo".
Yes.
Yes.
Check the drum motor.
Yes.
Check the noise filter circuit board.
Is there generated flip-flop signal at the mechanism control circuit board 32 ?
No.
Is drum pulse supplied to the servo circuit board TP-5?
No.
Check and confirm drum pulse and the pick-up head assembly.
Yes.
Yes.

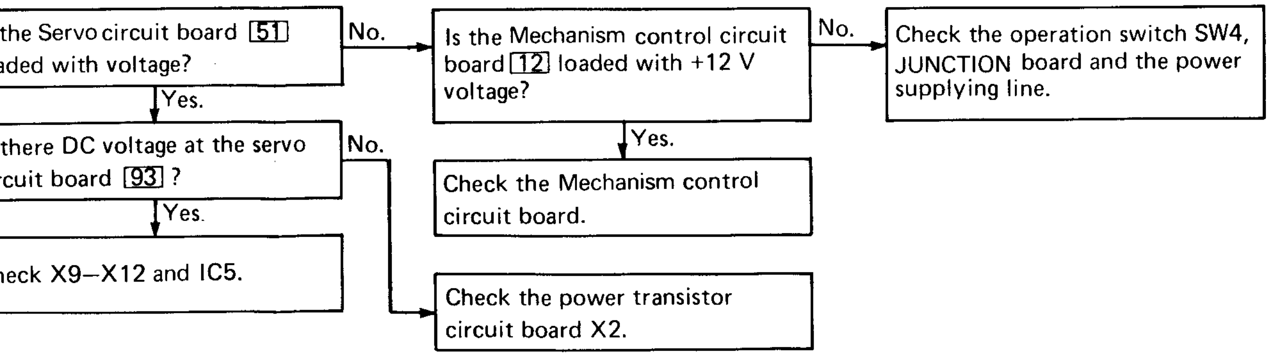

Is the stop solenoid released?
No.
Check the loading arm locking mechanism.
Yes.
Check the mechanism control circuit board IC1.

8-5-2 F.F. function is ineffective

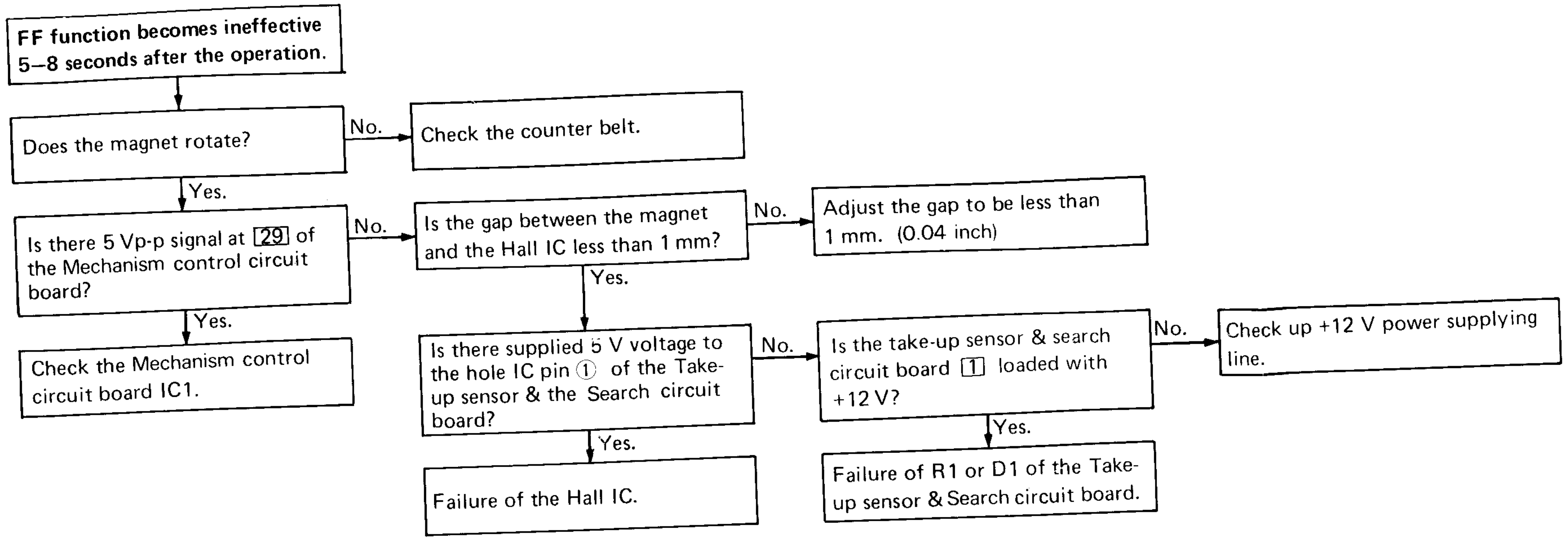

FF function is ineffective.
Is the cassette switch SW12 pushed?
No.
Check SW12. (CASSETTE SWITCH)
Yes.
Is the operation switch SW4 pushed?
No.
Check the operation mechanism.
Yes.
Does rotate the capstan motor?
No.
Is the capstan motor supplied with voltage?
No.
Is the Servo circuit board 101 loaded with voltage?
No.
Is the Servo circuit board 51 loaded with voltage?
No.
Is the Mechanisn board 12 loade voltage?
Yes.
Check the FF mechanism.
Yes.
Check the capstan motor.
Yes.
Check the noise filter circuit board.
Yes.
Is there DC voltage at the servo circuit board 93 ?
No.
Check the Mecha circuit board.
Yes.
Check the cassette tape.
Yes.
Check X9–X12 and IC5.
Check the powe circuit board X2

NOTE: All the following procedures for the articles 1 through 5 should be done without any cassette tape loaded.
Cover the photo transistors (END SENSOR, START SENSOR) with black vinyl tape beforehand.

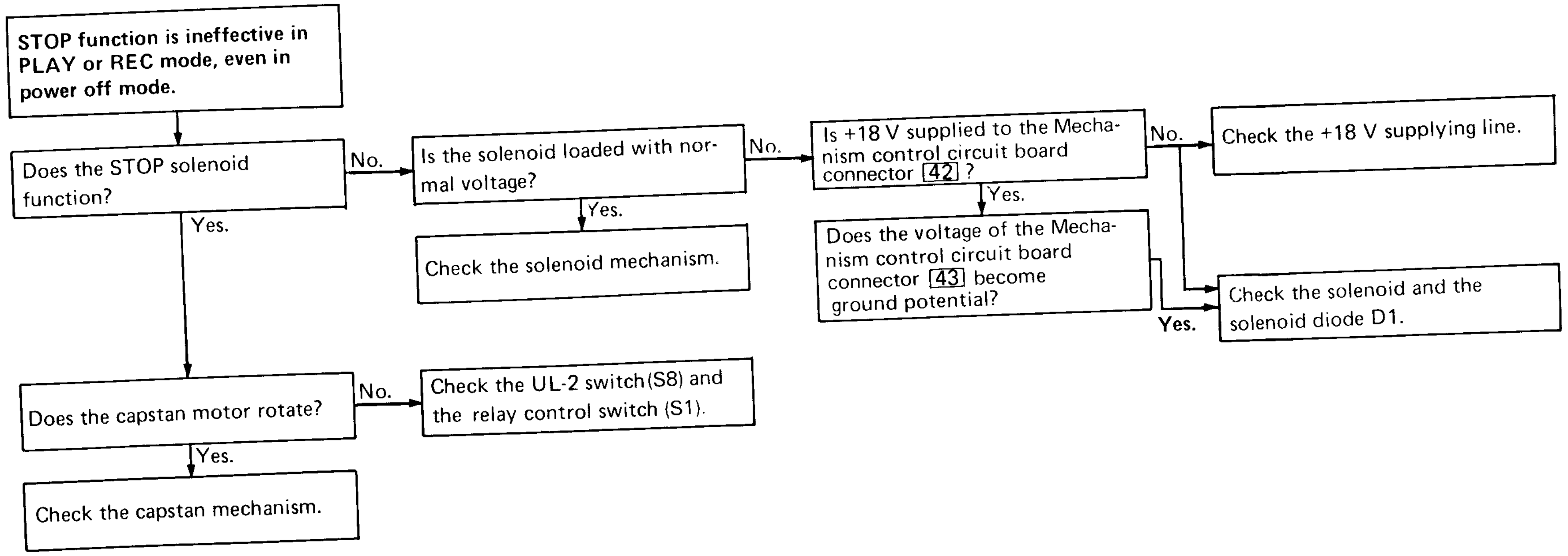

chanism control

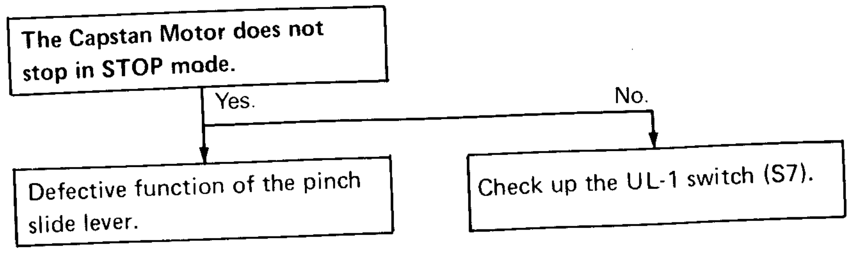

the Servo circuit board 51
aded with voltage?
No.
Yes.
Is the Mechanism control circuit board 12 loaded with +12 V voltage?
No.
Check the operation switch SW4, JUNCTION board and the power supplying line.
Yes.
there DC voltage at the servo
rcuit board 93 ?
No.
Check the Mechanism control circuit board.
Yes.
heck X9–X12 and IC5.
Check the power transistor circuit board X2.

8-5-3 F.F. function becomes ineffective

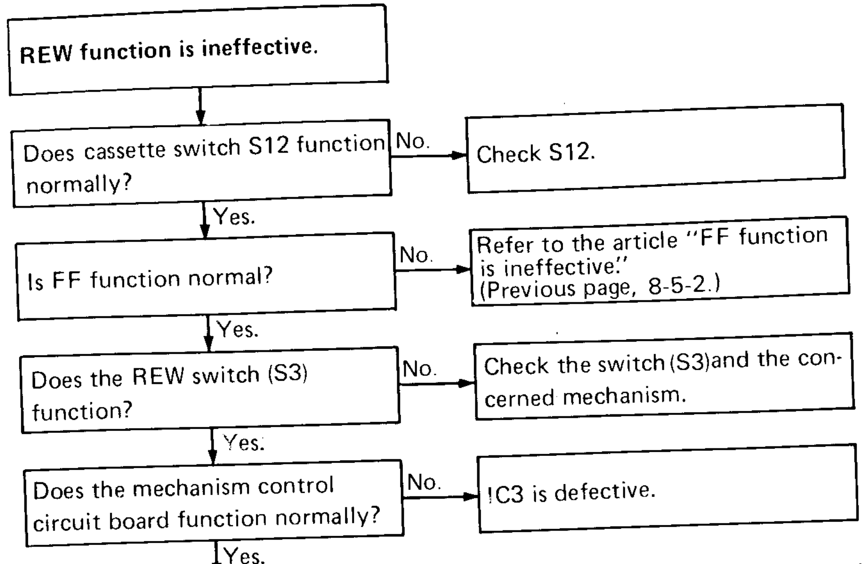

FF function becomes ineffective 5–8 seconds after the operation.
Does the magnet rotate?
No.
Check the counter belt.
Yes.
Is there 5 Vp-p signal at 29 of the Mechanism control circuit board?
No.
Is the gap between the magnet and the Hall IC less than 1 mm?
No.
Adjust the gap to be less than 1 mm. (0.04 inch)
Yes.
Check the Mechanism control circuit board IC1.
Yes.
Is there supplied 5 V voltage to the hole IC pin ① of the Take-up sensor & the Search circuit board?
No.
Is the take-up sensor & search circuit board 1 loaded with +12 V?
No.
Check up +12 V power supplying line.
Yes.
Failure of the Hall IC.
Yes.
Failure of R1 or D1 of the Take-up sensor & Search circuit board.

8-5-4 STOP function is ineffective


STOP function is ineffective in PLAY or REC mode, even in power off mode.
Does the STOP solenoid function?
No.
Is the solenoid loaded with normal voltage?
No.
Is +18 V supplied to the Mechanism control circuit board connector 42 ?
No.
Check the +18 V supplying line.
Yes.
Check the solenoid mechanism.
Yes.
Does the voltage of the Mechanism control circuit board connector 43 become ground potential?
Check the solenoid and the solenoid diode D1.
Yes.
Yes.
Does the capstan motor rotate?
No.
Check the UL-2 switch(S8) and the relay control switch (S1).
Yes.
Check the capstan mechanism.

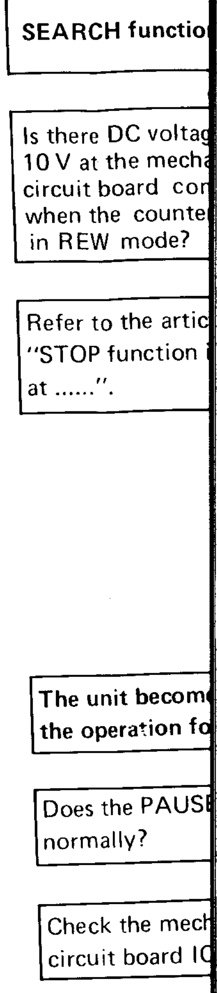

The Capstan Motor does not stop in STOP mode.
Yes.
No.
Defective function of the pinch slide lever.
Check up the UL-1 switch (S7).

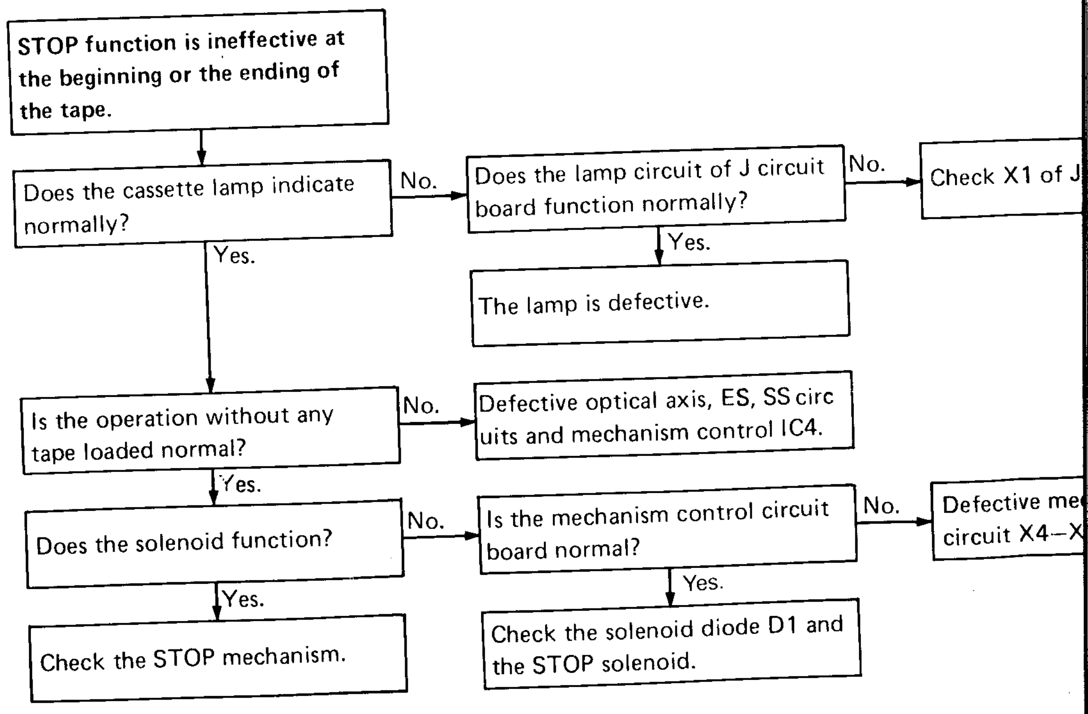
8-5-5 REW function is ineffective

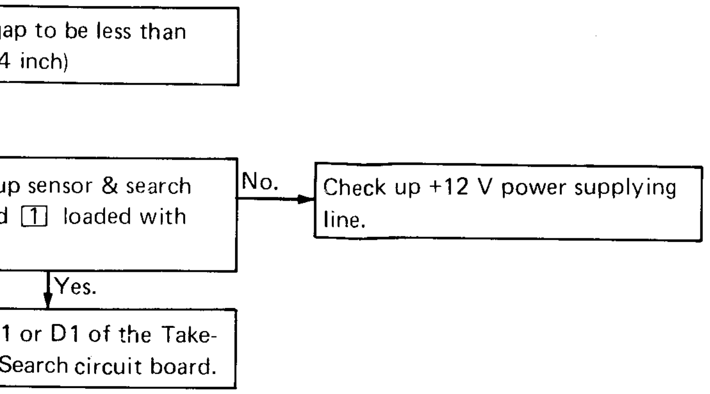

REW function is ineffective.
Does cassette switch S12 function normally?
No.
Check S12.
Yes.
Is FF function normal?
No.
Refer to the article "FF function is ineffective." (Previous page, 8-5-2.)
Yes.
Does the REW switch (S3) function?
No.
Check the switch(S3)and the concerned mechanism.
Yes.
Does the mechanism control circuit board function normally?
No.
!C3 is defective.
Yes.
Is the cassette tape tightly wrapped?
Yes.
Repeat FF and REW operations 2 or 3 times without intermitting.

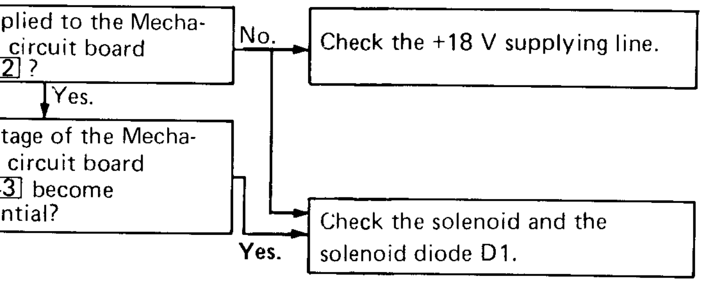
NOTE: All the above procedures for the subsection 8-5-5 should be done with a tape loaded.
Do not cover the photo transistors (END SENSOR, START SENSOR) with tape and the like.

8-5-6 SEARCH fu

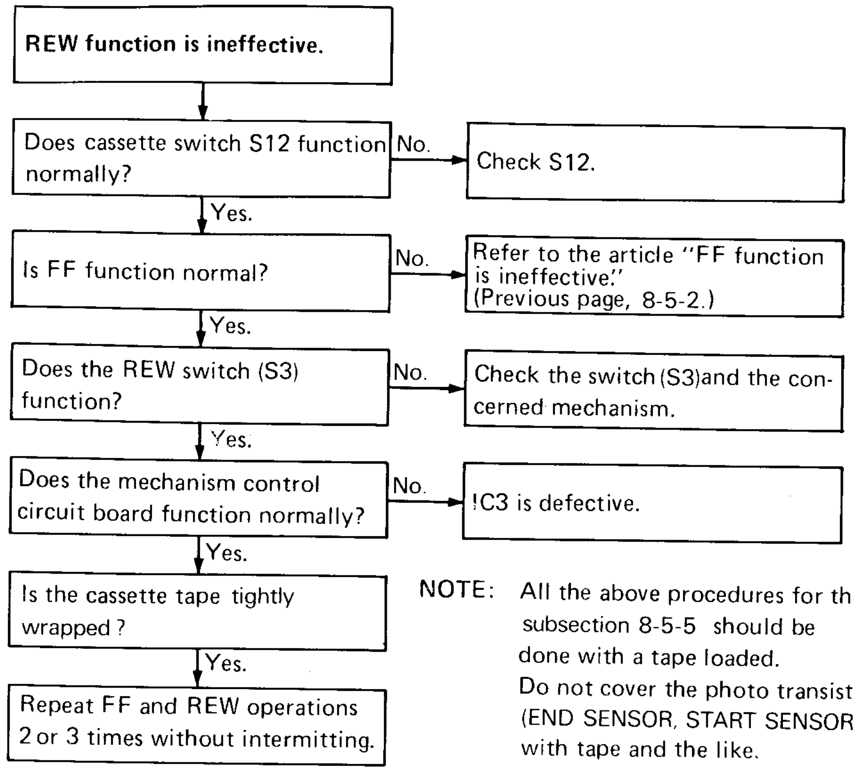

SEARCH functio
Is there DC voltag 10 V at the mecha circuit board co when the counte in REW mode?
Refer to the artic "STOP function i at ......".
The unit becom the operation fo
Does the PAUS normally?
Check the mec circuit board I


STOP function is ineffective at the beginning or the ending of the tape.
Does the cassette lamp indicate normally?
No.
Does the lamp circuit of J circuit board function normally?
No.
Check X1 of J
Yes.
The lamp is defective.
Yes.
Is the operation without any tape loaded normal?
No.
Defective optical axis, ES, SS circuits and mechanism control IC4.
Yes.
Does the solenoid function?
No.
Is the mechanism control circuit board normal?
No.
Defective me circuit X4–X
Yes.
Check the STOP mechanism.
Yes.
Check the solenoid diode D1 and the STOP solenoid.

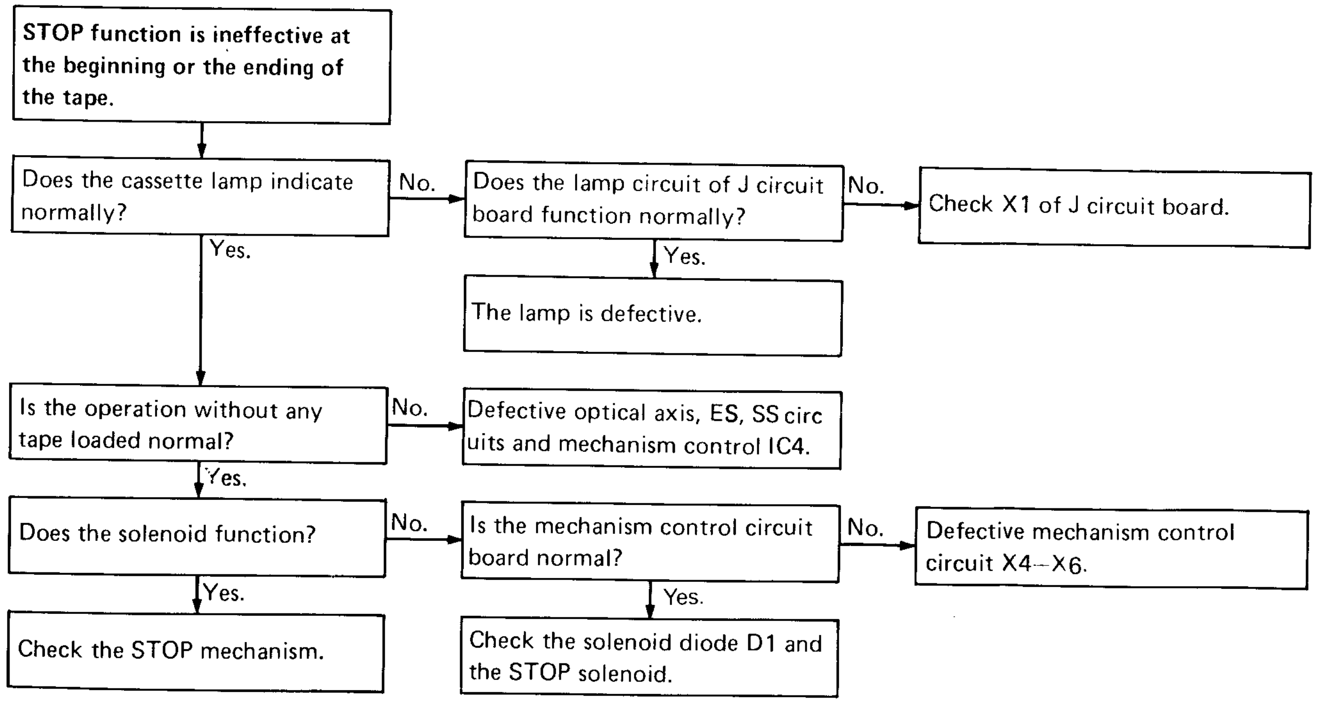

ap to be less than
4 inch)
up sensor & search
d 1 loaded with
No.
Check up +12 V power supplying line.
Yes.
1 or D1 of the Take-
Search circuit board.


plied to the Mecha-
circuit board
2 ?
No.
Check the +18 V supplying line.
Yes.
tage of the Mecha-
circuit board
3 become
ntial?
Check the solenoid and the solenoid diode D1.
Yes.

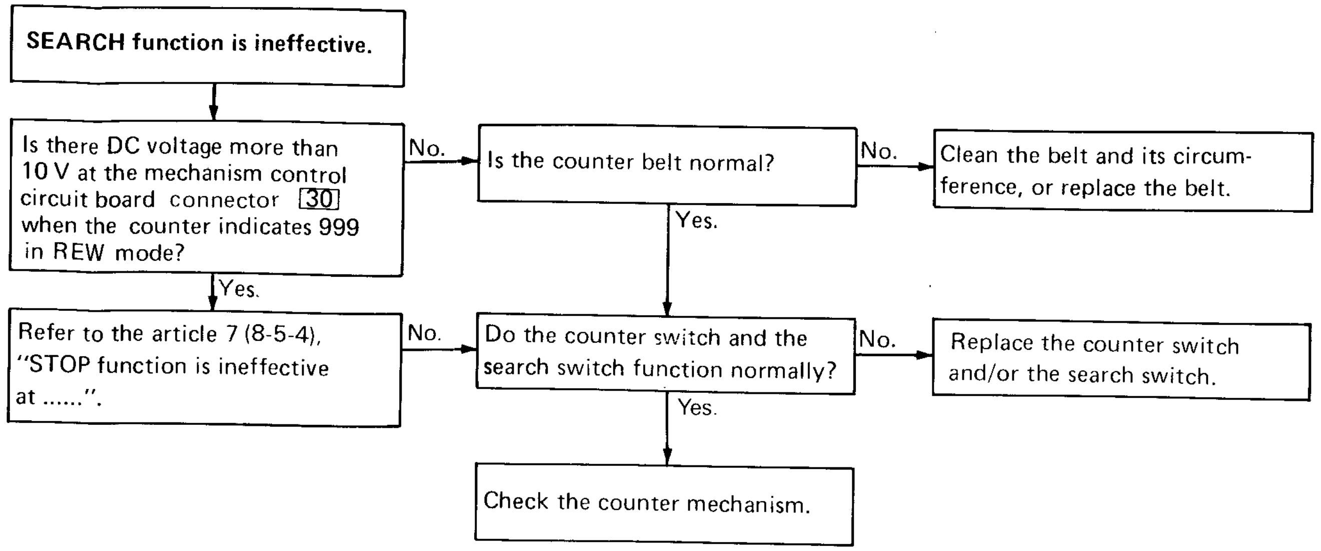
8-5-5 REW function is ineffective

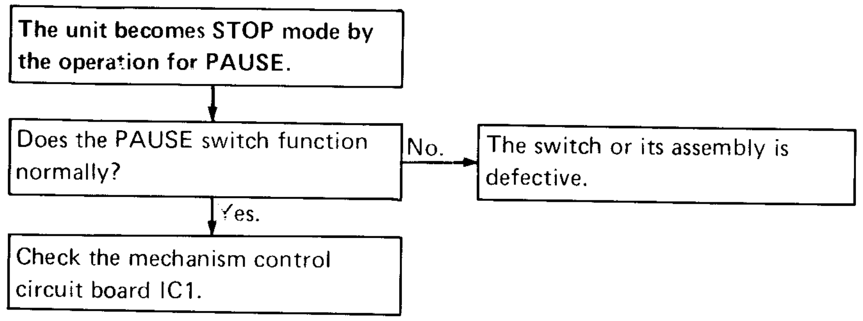

REW function is ineffective.
Does cassette switch S12 function normally?
No.
Check S12.
Yes.
Is FF function normal?
No.
Refer to the article "FF function is ineffective."
(Previous page, 8-5-2.)
Yes.
Does the REW switch (S3) function?
No.
Check the switch (S3) and the concerned mechanism.
Yes.
Does the mechanism control circuit board function normally?
No.
IC3 is defective.
Yes.
Is the cassette tape tightly wrapped?
Yes.
Repeat FF and REW operations 2 or 3 times without intermitting.

NOTE: All the above procedures for the subsection 8-5-5 should be done with a tape loaded.
Do not cover the photo transistors (END SENSOR, START SENSOR) with tape and the like.


STOP function is ineffective at the beginning or the ending of the tape.
Does the cassette lamp indicate normally?
No.
Does the lamp circuit of J circuit board function normally?
No.
Check X1 of J circuit board.
Yes.
The lamp is defective.
Yes.
Is the operation without any tape loaded normal?
No.
Defective optical axis, ES, SS circuits and mechanism control IC4.
Yes.
Does the solenoid function?
No.
Is the mechanism control circuit board normal?
No.
Defective mechanism control circuit X4–X6.
Yes.
Check the solenoid diode D1 and the STOP solenoid.
Yes.
Check the STOP mechanism.

8-5-6 SEARCH function is ineffective


SEARCH function is ineffective.
Is there DC voltage more than 10 V at the mechanism control circuit board connector 30 when the counter indicates 999 in REW mode?
No.
Is the counter belt normal?
No.
Clean the belt and its circumference, or replace the belt.
Yes.
Yes.
Refer to the article 7 (8-5-4), "STOP function is ineffective at ......".
No.
Do the counter switch and the search switch function normally?
No.
Replace the counter switch and/or the search switch.
Yes.
Check the counter mechanism.


The unit becomes STOP mode by the operation for PAUSE.
Does the PAUSE switch function normally?
No.
The switch or its assembly is defective.
Yes.
Check the mechanism control circuit board IC1.

SECTION 9

EXPLODED VIEWS AND PARTS LIST (-EG/-EK)

9.1 GENERAL RULES FOR NUMBERING METHOD OF SCREW/WASHER/E-RING . . . . 9 - 2

9.2 EXPLODED VIEW AND MAIN PARTS LIST . . . . 9 - 3

9.3 MAIN DECK-1 (M 1) . . . . 9 - 4

9.4 MAIN DECK-2 (M 2) 9-10

9.5 FUNCTION ASSEMBLY (M 3) 9-14

9.6 DRUM ASSEMBLY (M 4). 9-15

9.7 CASSETTE HOUSING ASSEMBLY (M 5) 9-16

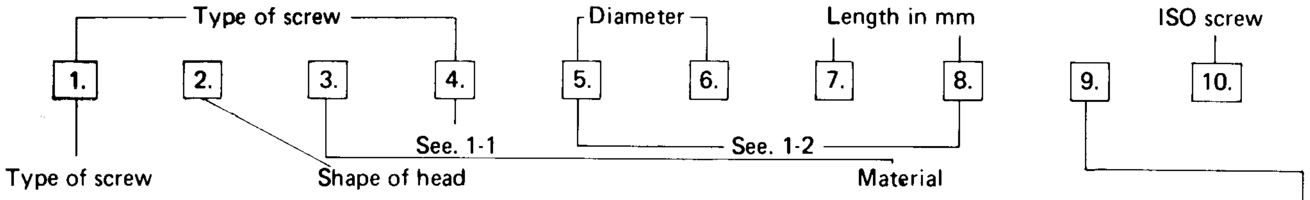
9.8 TUNER ASSEMBLY (M 6) 9-17

9.9 CABINET ASSEMBLY (M 7). 9-19

9.10 TIMER ASSEMBLY (M 8) 9-21

9.11 ACCESSORY (M 9) 9-22

9.1 GENERAL RULES FOR NUMBERING METHOD OF SCREW/WASHER/E-RING


Type of screw
Diameter
Length in mm
ISO screw
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
See. 1-1
See. 1-2
Type of screw
Shape of head
Material

S	Normal screw
N	Assembly screw
L	"
D	"
M	W. Wood screw
F	Feather screw
T	Set screw
Y	"
B	Bolt
N	Nut
W	Washer
R	E-ring
E	–
P	Spring

P		Pan head
S		Flat countersunk head
H		Oval countersunk head
D		Binding head
R		Round head
B		Round head
T		Truss head

Symbol letter	Material
S	Steel
E	Stainless steel
C	Cast iron
U	Bronze
B	Brass
P	Phosphor bronze
N	German silver
Y	Brass
A	Aluminum
Z	Zinc-alloy

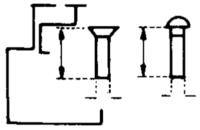
1-1 Type of screw

P	Cross-Recessed head screw
A	Tapping screw
B	Tapping screw

1-2 Diameter and Length of screw

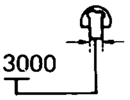
– Example –

SPBP3010ZS



(Diameter x 10)

E-ring Washer

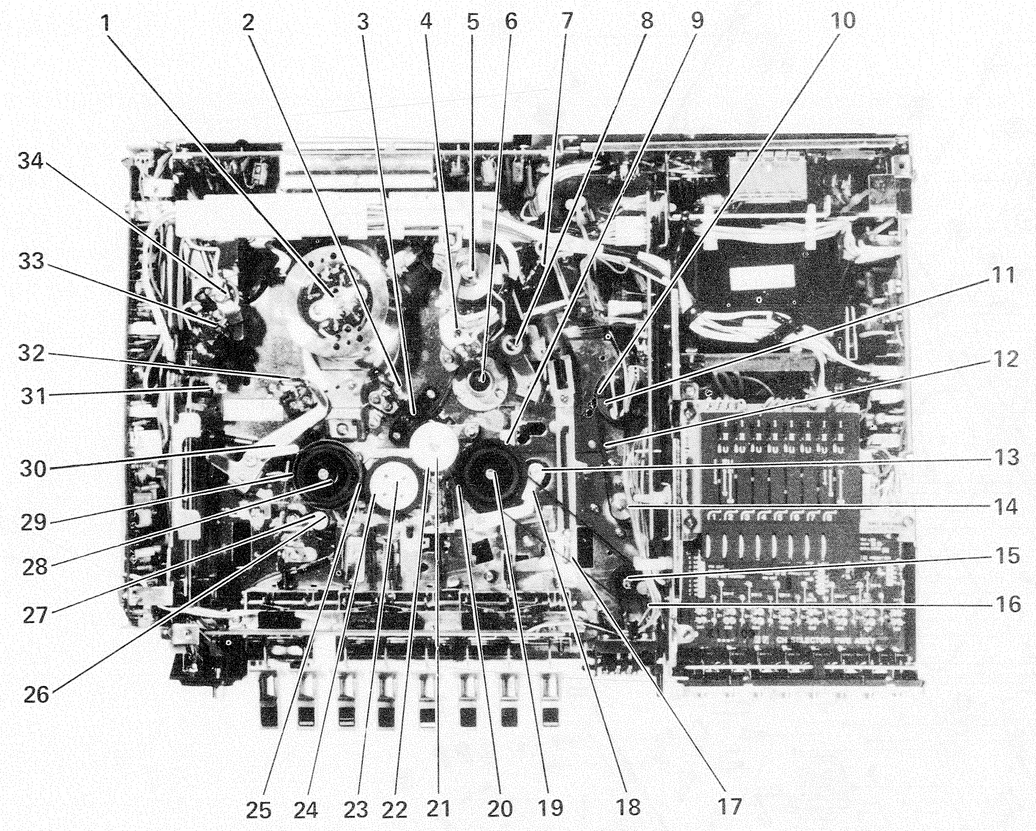


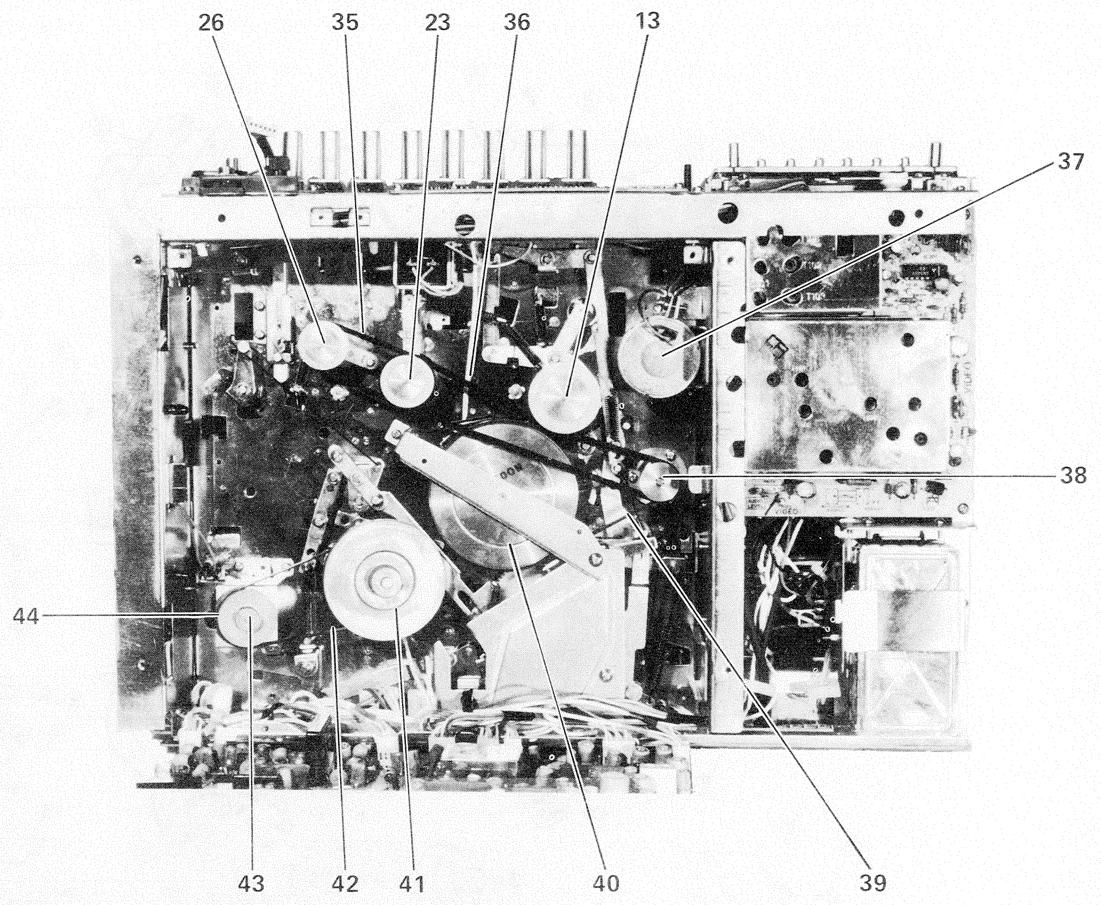
REE3000 WNS300N

Surface treatment

Symbol letter	Surface treatment
Z	Galvanization, dichromic acid treatment (MFZn2-C)
N	Nickel plating (MFNi2, MFNil)
R	Chrome plating (MBCr2, MBCr1)
G	Silver plating (SP4)
W	Nichrome platings
P	Phosphite treatment
B	Bronze plating
M	Black coloring after galvanization
F	Iron with black coloring

9.2 EXPLODED VIEW AND MAIN PARTS LIST

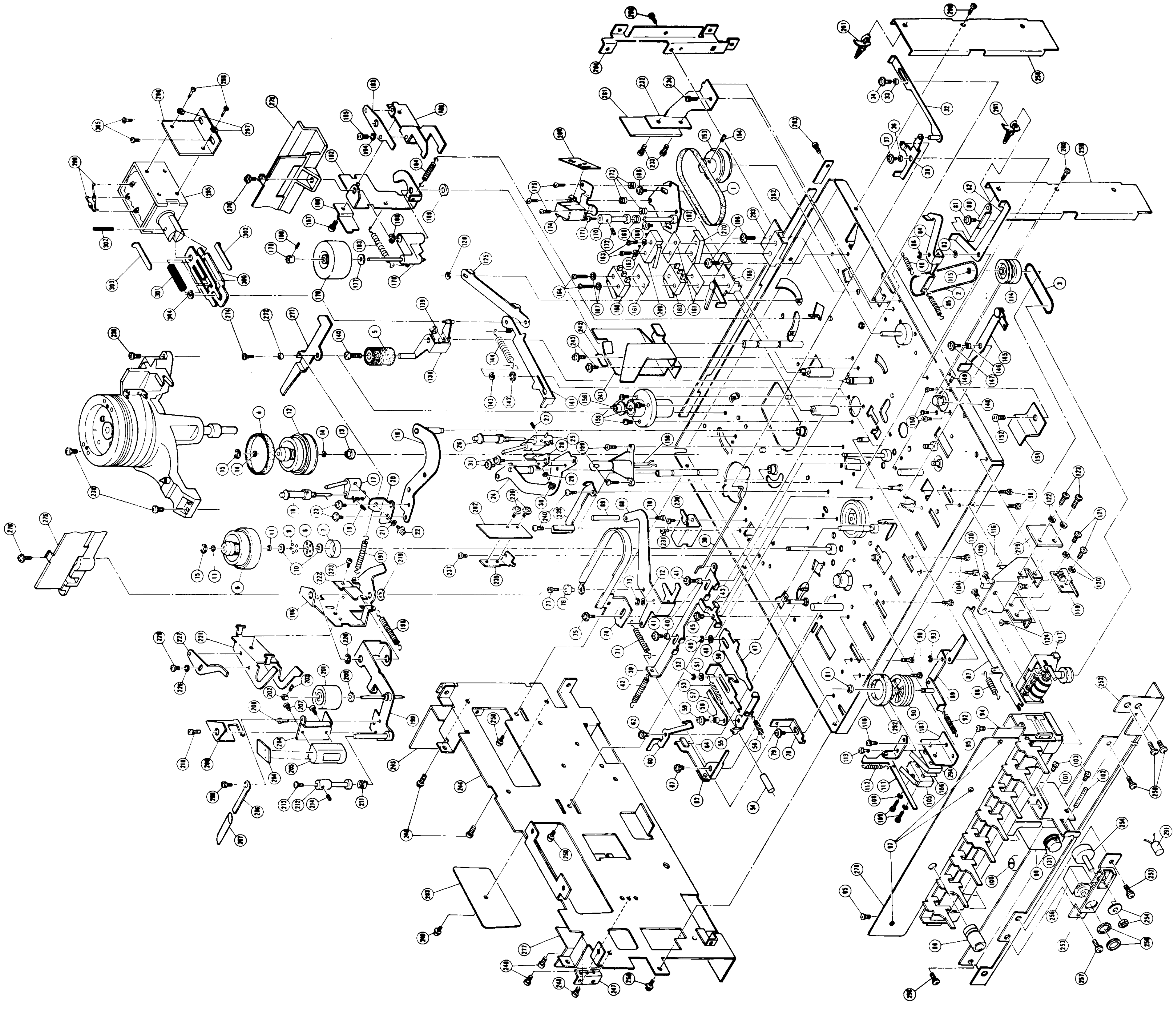




Symbol No.	Part Name	Part No.	Symbol No.	Part Name	Part No.
1	Upper Drum Ass'y	PU31332D	18	Take-up Brake	PU46246
2	Take-up Loading Arm	—	19	Take-up Reel Disk Ass'y	PU44913A
3	Cassette Lamp Ass'y	PUS46070	20	Take-up Loading Brake Ass'y	PU44827A
4	Audio/Control Head Sub Ass'y	PU46435-2M	21	F.F. Idler	PU47279
5	Take-up Impedance Roller Ass'y	PU45355A	22	F.F. Rubber Tire	PU44918-4
6	Capstan Bearing Ass'y	PU47205A	23	REW Idler Ass'y	PU46380
7	Pause Solenoid	PU46431	24	REW Rubber Tire	PU44918-2
8	Pinch Roller Ass'y	PU45275A	25	Tension Band Ass'y	PU44853A
9	Take-up Reel Disk Rubber Tire	PU44918	26	Unloading Idler Ass'y	PU46381
10	Start Sensor	—	27	Unloading Idler Rubber Tire	PU44918-3
11	Relay Pulley	PU44905-3	28	Supply Reel Disk	PU44922A
12	Relay Belt	PU44912	29	Loading Tension Brake Ass'y	PUS45886
13	Take-up Idler Ass'y	PU46862	30	Tension Arm	PU44851
14	Capstan Motor Pulley	PU44900-3	31	End Sensor	—
15	Counter Pulley Ass'y	PU44861A	32	Supply Loading Arm	—
16	Counter Belt-2	PU44863-2	33	Full Erase Head	PU31013
17	Counter Belt-1	PU44863	34	Supply Impedance Roller Ass'y	PU45355B

Symbol No.	Part Name	Part No.	Symbol No.	Part Name	Part No.
35	Unloading Belt	PU44912-3	41	Drum Pulley Ass'y	PU44965A
36	Reel Drive Belt	PU44911	42	Drum Belt	PU44912-5
37	Capstan Motor	PU45979P(-2)	43	Drum Motor Pulley Ass'y	PUS46023-0A
38	Relay Pulley Ass'y	PU44901A	44	Drum Motor	PU46414M
39	Capstan Belt	PU44912-2			
40	Capstan Flywheel Ass'y	PU31936A			

9.3 MAIN DECK-1 M 1



M 1 MAIN DECK-1

Symbol No.	Part No.	Part Name	Remarks	Q'ty
1	PU44912	Capstan Motor Belt		1
2	PU44863	Counter Belt (1)		1
3	PU44863-2	Counter Belt (2)		1
4	PU44918	Take-up Reel Disc Rubber Tire		1
5	PU45275A	Pinch Roller Ass'y		1
6	PU44922A	Supply Reel Disc		1
7	PU44919	Bearing Holder		1
8	PU44920	Retainer		1
9	PU41135-3	Steel Ball		5
10	PU44921	Spacer		2
11	Q03093-834	Washer	0.13 thick for adjusting reel disc height	–
	Q03093-827	Washer	0.25 thick ″	–
	Q03093-828	Washer	0.5 thick ″	–
12	PU44913A	Take-up Reel Disc Ass'y		1
13	PU45789	Collar		1
14	Q03093-834	Washer	0.13 thick for adjusting reel disc height	–
	Q03093-827	Washer	0.25 thick ″	–
	Q03093-828	Washer	0.5 thick ″	–
15	REE2000	"E" Ring		2
16	PU44982A	Supply Loading Arm Sub Ass'y		1
17	PU44949A	Supply Slant Pole Base Ass'y		1
18	PU44952A	Guide Roller Ass'y		1
19	YFS3004BS	Set Screw		1
20	PU44957	Holder Bracket (Supply)		1
21	T30302-025	Collar		1
22	DPSP3008ZS	Screw		1
23	DPSP3005ZS	Screw		2
24	PU44979A	Take-up Loading Arm Sub Ass'y		1
25	PU44958A	Take-up Slant Pole Base Ass'y		1
26	PU44952A	Guide Roller Ass'y		1
27	YFS3004BS	Set Screw		1
28	PU44960	Holder Bracket (Take-up)		1
29	T30302-025	Collar		1
30	DPSP3008ZS	Screw		1
31	DPSP3005ZS	Screw		2
32	PU44891A	Slide Lever Ass'y		1
33	T30302-008	Collar		1
34	DPSP3006ZS	Screw		1
35	PU44821	Connecting Lever		1
36	PU43769-15	Collar		1
37	DPSP3006ZS	Screw		1
38	PU44822	Rod		1
39	PU44825	Slide Plate		1
40	T30302-005	Collar		2
41	DPSP3006ZS	Screw		2
42	PU35005-48	Spring		1
43	PU44826	Safety Plate		1
44	–	–		–
45	PU46732	Frange Screw		1
46	PU35005-28	Spring		1
47	PU45793	OFF Lever		1
48	Q03093-502	Washer		1
49	REE3000	"E" Ring		1
50	PU44845	REW Lever	M12	1

Symbol No.	Part No.	Part Name	Remarks	Q'ty
51	Q03093-430	Washer		1
52	REE2500	"E" Ring		1
53	T30300-109	Spring		1
54	QXT658H-010	Vinyl Tube		1
55	PU44846	Idler Off Lever		1
56	PU35005-50	Spring		1
57	PU45376	Tension Arm Off Lever		1
58	PU43769-19	Collar		1
59	DPSP3008ZS	Screw		1
60	PU44847	Tension Arm Cancel Lever		1
61	–	–		–
62	PU46732	Frange Screw		1
63	–	Supply Loading Tension Lever Ass'y	(65) Supply Loading Tension Brake Ass'y	1
64	PU42199	Brake Shoe		1
65	PUS45886	Supply Loading Tension Brake Ass'y		–
66	–	–		–
67	PU46732	Frange Screw		1
68	PU44851	Tension Arm		1
69	PU44852	Tension Pole		1
70	SSSP2606Z	Screw		1
71	PU35005-80	Spring		1
72	Q03093-430	Washer		1
73	REE2500	"E" Ring		1
74	PU44853A	Tension Band Ass'y		1
75	DPSP3006ZS	Screw		1
76	PU44859	Washer		1
77	SPSP2006N	Screw		1
78	PU44823	Bracket		1
79	DPSP3006ZS	Screw		1
80	PU44827A	Take-up Loading Brake Ass'y		1
81	LPSP3006ZS	Screw		1
82	PU44838	Loading Brake OFF Lever		1
83	Q03093-507	Washer		1
84	PU46246	Take-up Brake		1
85	T30300-49	Spring		1
86	REE2500	"E" Ring		1
87	PU44837	F.F. Lever		1
88	T30300-109	Spring		1
89	PU44833A	F.F. Arm Ass'y		1
90	PU47279	F.F. Idler		1
91	REE2500	"E" Ring		1
92	PU35005-28	Spring		1
93	REE3000	"E" Ring		1
94	PU31326	Operation P.C. Board Bracket		1
95	LPSP3006ZS	Screw		2
96	PU44887	Lamp Bush		1
97	LPSP3006ZS	Screw		3
98	LPSP3006ZS	Screw		5
99	PU44623	Solenoid		1
100	V03C	Diode		1
101	PU44864	Solenoid Bracket		1
102	PRE3028	Spring Pin		1
103	LPSP3005ZS	Screw		2
104	DPSP3006ZS	Screw		2
105	QSM1S01-028	Micro switch	M12	1

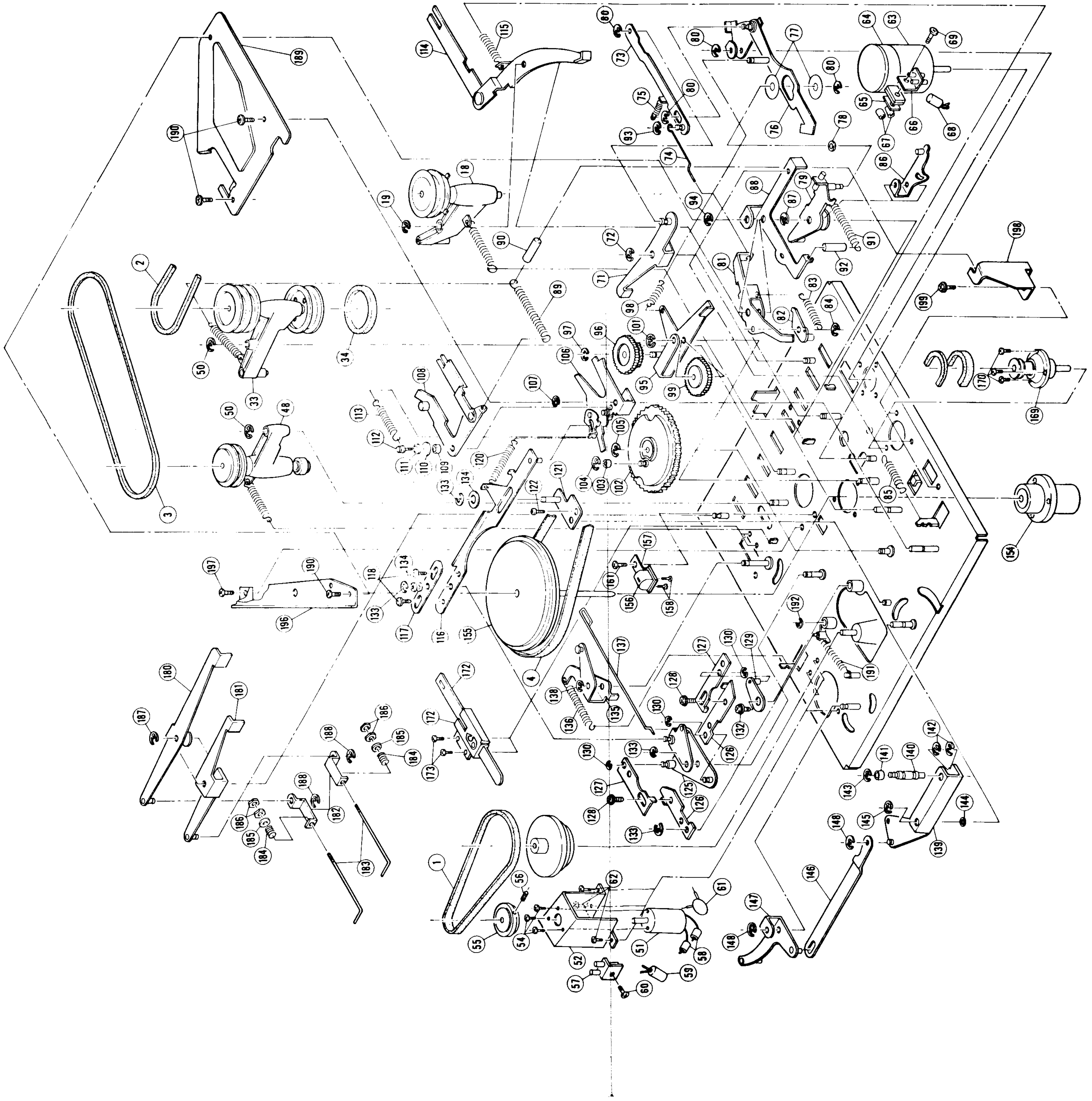
Symbol No.	Part No.	Part Name	Remarks	Q'ty
106	PU44212	Spacer		1
107	PU45459	Switch Bracket		1
108	WLS2300N	Lock Washer		2
109	SPBP2310N	Screw		2
110	LPSP3006ZS	Screw		1
111	PU44848A	REC Safety Lever Ass'y		1
112	PU35005-34	Spring		1
113	LPSP3006ZS	Screw		1
114	PU44861A	Counter Pulley Ass'y		1
115	REE2500	"E" Ring		1
116	PU45873A	Counter Bracket Ass'y		1
117	PU44669	Tape Counter		1
118	LPSP3006ZS	Screw		2
119	PU44738	Push Switch	S10	1
120	WLS2000N	Lock Washer		2
121	SPSP2004Z	Screw		2
122	WLS2000N	Lock Washer		2
123	SPSP2004Z	Screw		2
124	LPSP3006ZS	Screw	–	2
125	PU47191	Pinch Slide Plate		1
126	–	–		–
127	T30300-021	Spring		1
128	REE3000	"E" Ring		1
129	LPSP3005ZS	Screw		1
130	55234	Wire Clamp		1
131	PU30080-55	Spring		1
132	–	–		–
133	–	–		–
134	–	–		–
135	–	–		–
136	–	–		–
137	DPSP3006ZS	Screw		1
138	PU47201A	Pinch Roller Lever Ass'y		1
139	REE5000	"E" Ring		1
140	LPSP2604Z	Screw		1
141	PU47190	Memory Plate		1
142	Q03093-502	Washer		3
143	REE3000	"E" Ring		2
144	PU35005-40	Spring		1
145	PU44840A	Eject Plate Ass'y		1
146	T30302-008	Collar		1
147	DPSP3006ZS	Screw		1
148	PU44900-3	Capstan Motor Pulley		1
149	YWS3003PS	Set Screw		1
150	LPSP3005ZS	Screw		3
151	PU45660	Belt Guard		1
152	LPSP3006ZS	Screw		1
153	PU44905-3	Relay Pulley (A)		1
154	YWS3004PS	Set Screw		1
155	LPSP3006ZS	Screw	for Capstan Holder Ass'y	3
156	PU47209	Shield Cap		1
157	–	–		–
158	PUS46070	Cassette Lamp Ass'y		1
159	LPSP3006ZS	Screw		2
160	QSM1S01-028	Microswitch	M7, M8	2

Symbol No.	Part No.	Part Name	Remarks	Q'ty
161	PU44212	Spacer		3
162	WLS2300N	Lock Washer		4
163	SPBP2310N	Screw		2
164	SPBP2318N	Screw		2
165	PU47183A	Switch Bracket Ass'y		1
166	LPSP3006ZS	Screw		2
167	PU45331A	Audio/Control Head Base Ass'y		1
168	DPSP3008ZS	Screw		2
169	PU30080-49	Spring		1
170	PU45271-2	Take-up Guide Pole		1
171	SDBP3006RS	Screw		1
172	YFS3004BS	Set Screw		1
173	PU30080-49	Spring		3
174	PU46435-2M	Audio/Control Head Sub Ass'y	or, PU46435-2T	1
175	SPSP2610Z	Screw		3
176	PU45256A	Take-up Arm Ass'y		1
177	Q03093-829	Washer		1
178	PU45355A	Take-up Impedance Roller Ass'y		1
179	PU45260	Stopper		1
180	YWS3003PS	Set Screw		1
181	–	–		–
182	PU45261	Lever		1
183	PU35005-96	Spring		1
184	T30300-114	Spring		1
185	PU45262	Take-up Lock Arm		1
186	PU45263	Spring Plate		1
187	LPSP3006ZS	Screw		1
188	REE5000	"E" Ring		1
189	Q03093-508	Washer		1
190	–	–		–
191	–	–		–
192	–	–		–
193	PU45354	Take-up Guide Roller Stopper		1
194	WNB2600N	Washer		1
195	SPSP2603Z	Screw		1
196	PU45272	Lever		1
197	PU35005-41	Spring		1
198	PU35005-86	Spring		1
199	PU45264A	Head Arm Ass'y		1
200	Q03093-830	Washer		1
201	PU45355B	Supply Impedance Roller Ass'y		1
202	PU45260	Stopper		1
203	YWS3003PS	Set Screw		1
204	PU45270	Full Erase Head Holder		1
205	PU31013	Full Erase Head		1
206	–	–		–
207	LPSP2004Z	Screw		2
208	SPSP3006ZS	Screw		1
209	PU45484	Stopper		1
210	LPSP3005ZS	Screw		1
211	PU30080-49	Spring		1
212	PU45271	Supply Guide Pole		1
213	SDBP3006RS	Screw		1
214	YFS3004BS	Set Screw		1
215	–	–		–

Symbol No.	Part No.	Part Name	Remarks	Q'ty
216	–	–		–
217	WBS4000	Washer		1
218	NNB4000NS	Nut		1
219	Q03093-508	Washer		1
220	REE5000	"E" Ring		1
221	PU45273	Supply Lock Arm		1
222	PU45263	Spring Plate		1
223	LPSP3006ZS	Screw		1
224	–	–		–
225	–	–		–
226	–	–		–
227	PU45353	Supply Guide Roller Stopper		1
228	WNB2600N	Washer		1
229	SPSP2603Z	Screw		1
230	PU45274	Guide		1
231	LPSP3006ZS	Screw		2
232	PU46396	Start Sensor P.C. Board Bracket		1
233	LPSP3006ZS	Screw	for Start Sensor P.C. Board	1
234	LPSP3006ZS	Screw		1
235	PU44895	End Sensor P.C. Board Bracket		1
236	DPSP3006ZS	Screw	for End Sensor P.C. Board	2
237	LPSP3006ZS	Screw		1
238	DPSP3010ZS	Screw	for Drum Ass'y	3
239	PU44906	Stopper		1
240	LPSP3006ZS	Screw		2
241	PU31934	Cassette Door Guide		1
242	PU46356	Cushion		1
243	DPSP3005ZS	Screw		2
244	PU20530A	Side Bracket		1
245	PU46655	Side Holder		1
246	LPSP3006ZS	Screw		4
247	PU44763	Guide Bracket		1
248	LPSP3006ZS	Screw		1
249	DPSP3006ZS	Screw	for Power Transistor P.C. Board	1
250	LPSP3006ZS	Screw	for Side Bracket	3
251	–	–		–
252	PU20537	Front Stay		1
253	PU45997	MIC. Jack Holder		1
254	QVF166B-0F5	Variable Resistor	for TRACKING	1
255	–	–		–
256	QMS6303-003	Mic. Jack Ass'y		1
257	LPSP3006ZS	Screw		2
258	LPSP3006ZS	Screw		4
259	PU44795	Foot		2
260	LPSP3006ZS	Screw		2
261	PU43146-2	Circuit Board Supporter		2
262	PU20538	Rear Stay		1
263	LPSP3006ZS	Screw		4
264	PU44742-2	Circuit Board Holder		1
265	LPSP3006ZS	Screw		2
266	55234	Wire Clump		1
267	QXT3320-025	Vinyl Tube		1
268	LPSP3006ZS	Screw		1
269	QSM1S01-014	Microswitch	M6	1
270	PU47370	Leaf Spring		1

Symbol No.	Part No.	Part Name	Remarks	Q'ty
271	PU46086	Lock Lever		1
272	T30302-004	Collar		1
273	–	–		–
274	DPSP3005ZS	Screw		1
275	PU31492	Wire Housing		1
276	DPSP3006ZS	Screw		2
277	PU44744	Side Holder		1
278	–	OPE. PWB Ass'y	REF: 09	1
279	–	T.U. Sens & Search PWB Ass'y	REF: 21	1
280	–	A/CTL HEAD PWB	REF: 16	1
281	–	S.Sens PWB Ass'y	REF: 19	1
282	–	End Sens PWB Ass'y	REF: 20	1
283	–	P.Tr PWB	REF: 23	1
284	–	Full Erase Head PWB	REF: 17	1
285	–	–		–
286	–	–		–
287	–	–		–
288	–	–		–
289	–	–		–
290	–	–		–
291	QEN41CA-475	E. Cap		1
292	PU44918-4	F.F. Rubber Tire		1
293	PU47188	SW Bracket		.
294	PU47376	Leaf Spring		1
295	PU46431	Pause Solenoid		1
296	PU47187	Bracket		1
297	WNS3000N	Washer		2
298	LPSP3006ZS	Screw		2
299	VO3C	Diode		2
300	PU47189	Spring Holder		2
301	PU30080-56	Spring		1
302	PRE3010	Spring Pin		1
303	PU47327	Spacer		2
304	REE2500	"E" Ring		1
305	DPSP3006ZS	Screw		2

9.4 MAIN DECK-2 M 2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M 2 MAIN DECK-2

Symbol No.	Part No.	Part Name	Remarks	Q'ty
1	PU44912-5	Drum Belt		1
2	PU44911	Rew. Idler Belt		1
3	PU44912-3	Unloading Idler Belt		1
4	PU44912-2	Capstan Belt		1
5	–	–		–
6	–	–		–
7	–	–		–
8	–	–		–
9	–	–		–
10	–	–		–
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13	–	–		–
14	–	–		–
15	–	–		–
16	–	–		–
17	–	–		–
18	PU46862	Take-up Idler Ass'y	Incl: Spring (PU35005-14)	1
19	REE3000	"E" Ring		1
20	–	–		–
21	–	–		–
22	–	–		–
23	–	–		–
24	–	–		–
25	–	–		–
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29	–	–		–
30	–	–		–
31	–	–		–
32	–	–		–
33	PU46380	REW Idler Ass'y	Incl: Spring (PU35005-73)	1
34	PU44918-2	REW Rubber Tire		1
35	–	–		–
36	–	–		–
37	–	–		–
38	–	–		–
39	–	–		–
40	–	–		–
41	–	–		–
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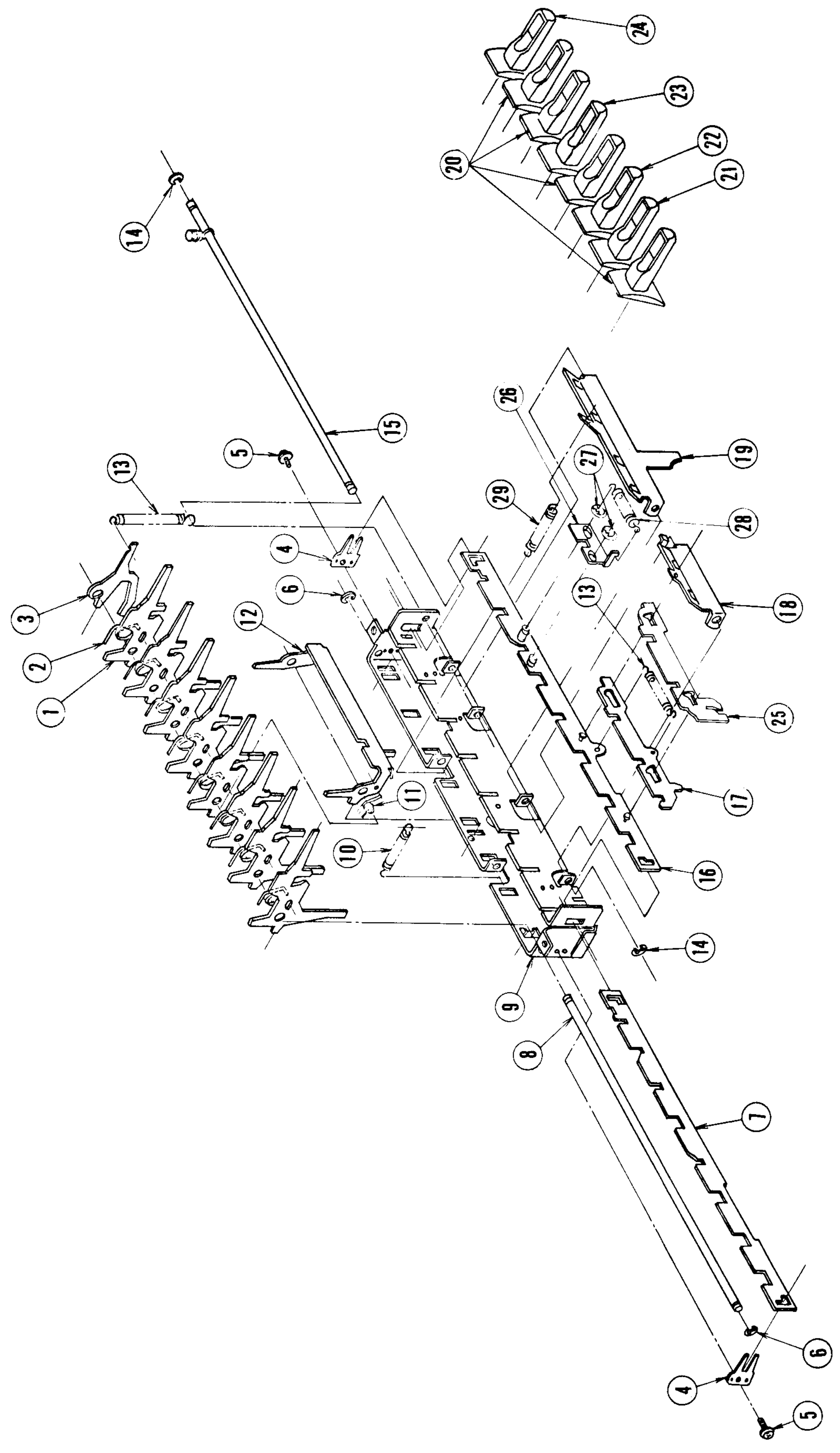
43	–	–		–
44	–	–		–
45	–	–		–
46	–	–		–
47	–	–		–
48	PU46381	Unloading Idler Ass'y	Incl: Spring (T30300-114)	1
49	–	–	R. Tire (PU44918-3)	–
50	REE3000	"E" Ring		2
51	PU46414M	Drum Motor	or PU44619	1
52	PU31335.	Drum Motor Bracket		1
53	–	–	Assembled from:	–
54	LPSP2004Z	Screw	• Motor Pulley (PU45326) • Oil Fence (PU47391)	3
55	PUS46023-0A	Drum Motor Pulley Ass'y	• Set Screw: 56	1

Symbol No.	Part No.	Part Name	Remarks	Q'ty
56	YWS3003PS	Setscrew		1
57	V03082-2	Feed Through Capacitor Ass'y		1
58	PU45811	Ferrite Beads		2
59	QEW41HA-105	Electrolytic Capacitor		1
60	DPSP3006ZS	Screw		1
61	QCF11HP-223	Ceramic Capacitor		1
62	LPSP3004ZS	Screw		3
63	PU45979P(-2)	Capstan Motor	or PU45979M	1
64	PU45980	Capstan Motor Band		1
65	PU43730	Tapping Plate		1
66	V03082-2	Feed Through Capacitor Ass'y		1
67	PU45811	Ferrite Beads		2
68	QEW41HA-105	Electrolytic Capacitor		1
69	LPSP3010ZS	Screw		1
70	–	–		–
71	PU45313A	PLAY Lever (1) Ass'y		1
72	REE3000	"E" Ring		1
73	PU45319A	PLAY Lever (2) Ass'y		1
74	PU45321	Rod		1
75	PU35005-6	Spring		1
76	PU45315C	PLAY Lever (3) Ass'y		1
77	Q03093-620	Washer		2
78	Q03093-102	Washer		1
79	PU45299A	Change Lever Ass'y		1
80	REE3000N	"E" Ring		2
81	PU45306A	Change Arm Lock Lever Ass'y		1
82	PU45308A	Drive Arm Lock Lever Ass'y		1
83	REE3000	"E" Ring		1
84	PU35005-53	Spring		1
85	PU35005-16	Spring		1
86	PU45301A	Kick Lever Ass'y		1
87	REE5000	"E" Ring		1
88	PU45303B	Timing Arm Ass'y		1
89	PU35005-93	Spring		1
90	QXT665H-025	Vinyl Tube		1
91	T30300-003	Spring		1
92	GA40154-2	Moltplen		1
93	REE3000	"E" Ring		1
94	REE5000	"E" Ring		1
95	PU47213A	Gear Arm Ass'y		1
96	PU47215	Stopped Gear		1
97	REE3000	"E" Ring		1
98	T30300-029	Spring		1
99	PU45298-2	Change Gear		1
100	–	–		–
101	REE4000	"E" Ring		1
102	PU45311A	Timing Gear Ass'y		1
103	PU43769-22	Collar		1
104	REE3000	"E" Ring		1
105	REE4000	"E" Ring		1
106	PU45242A	Drive Arm Ass'y		1
107	REE5000	"E" Ring		1
108	PU45247A	Change Arm Ass'y	Incl: Collar (PU43769-18)	1
109	T30302-025	Collar	"E" Ring (REE3000)	1
110	Q03091-103	Washer		1

Symbol No.	Part No.	Part Name	Remarks	Q'ty
111	WLS3000	Lock Washer		1
112	PU44224	Spring Hook		1
113	PU35005-74	Spring		1
114	PU46228B	Lock Lever Ass'y		1
115	PU35005-41	Spring		1
116	PU45238A	Slide Plate Ass'y	(119) Slide Plate Ass'y	1
117	PU45240	Plate		1
118	DPSP3006ZS	Screw		2
119	PU45841A	Slide Plate Ass'y		–
120	PU35005-75	Spring		1
121	PU46853A	Spring Plate Ass'y		1
122	DPSP3005ZS	Screw		1
123	–	–		–
124	–	–		–
125	PU44987A	Rotary Lever Ass'y		1
126	PU45821	Adjusting Plate (1)	(131) Stepped Lever Ass'y	2
127	PU45820	Adjusting Plate (2)		2
128	DPSP3005ZS	Screw		2
129	PU44985A	Supply Lever Ass'y		1
130	REE3000	"E" Ring		3
131	PU45836A	Stepped Lever Ass'y		–
132	DPSP3006ZS	Screw		1
133	REE3000	"E" Ring		3
134	Q03093-502	Washer		2
135	PU44881A	Tension Cam Ass'y		1
136	T30300-78	Spring		1
137	PU44883	Rod		1
138	REE3000	"E" Ring		1
139	PU45250A	Take-up Lock Lever Ass'y		1
140	PU45252	Stud		1
141	PU43769-23	Collar		1
142	REE4000	"E" Ring		2
143	REE3000	"E" Ring		1
144	Q03093-507	Washer		1
145	REE5000	"E" Ring		1
146	PU45255	Connecting Lever		1
147	PU45253C	Supply Lock Lever Ass'y		1
148	REE3000	"E" Ring		2
149	–	–		–
150	–	–		–
151	–	–		–
152	–	–		–
153	–	–		–
154	PU47205A	Capstan Bearing Ass'y		–
155	PU31936A	Capstan Flywheel Ass'y		1
156	PU47199	Pick-up Head		1
157	PU44909	Head Bracket		1
158	SPBP2002N	Screw		2
159	–	–		–
160				
161	–	–		–
162	–	–		–
163	–	–		–
164	–	–		–
165	–	–		–

Symbol No.	Part No.	Part Name	Remarks	Q'ty
166	–	–		–
167	–	–		–
168	–	–		–
169	PU44901A	Relay Pulley Ass'y	incl: Relay Pulley (B) (PU44904; FOB:280,–)	–
170	LPSP3006ZS	Screw		3
171	PU44871A	Pause Lever Ass'y		1
172	PU44874A	Lock Bracket Ass'y		1
173	LPSP3006ZS	Screw		2
174	–	–		–
175	–	–		–
176	–	–		–
177	–	–		–
178	–	–		–
179	–	–		–
180	PU44865A	Full Record (REC) Lever Ass'y		1
181	PU44867A	After Record (DUB) Lever Ass'y		1
182	PU44869	Connecting Lever		2
183	PU44870	Rod		2
184	PU30080-46	Spring		2
185	WNB2300N	Washer		2
186	NNB2300N	Nut		4
187	REE3000	"E" Ring		1
188	REE2500	"E" Ring		2
189	PU45325-2	Plate		1
190	DPSP3006ZS	Screw		3
191	T30300-029	Spring		1
192	REE4000	"E" Ring		1
193	–	–		–
194	–	–		–
195	–	–		–
196	PU47210A	Capstan Bracket Ass'y		1
197	LPSP3006ZS	Screw		1
198	PU47476A	Spring Hook Ass'y		1
199	DPSP3006ZS	Screw		1

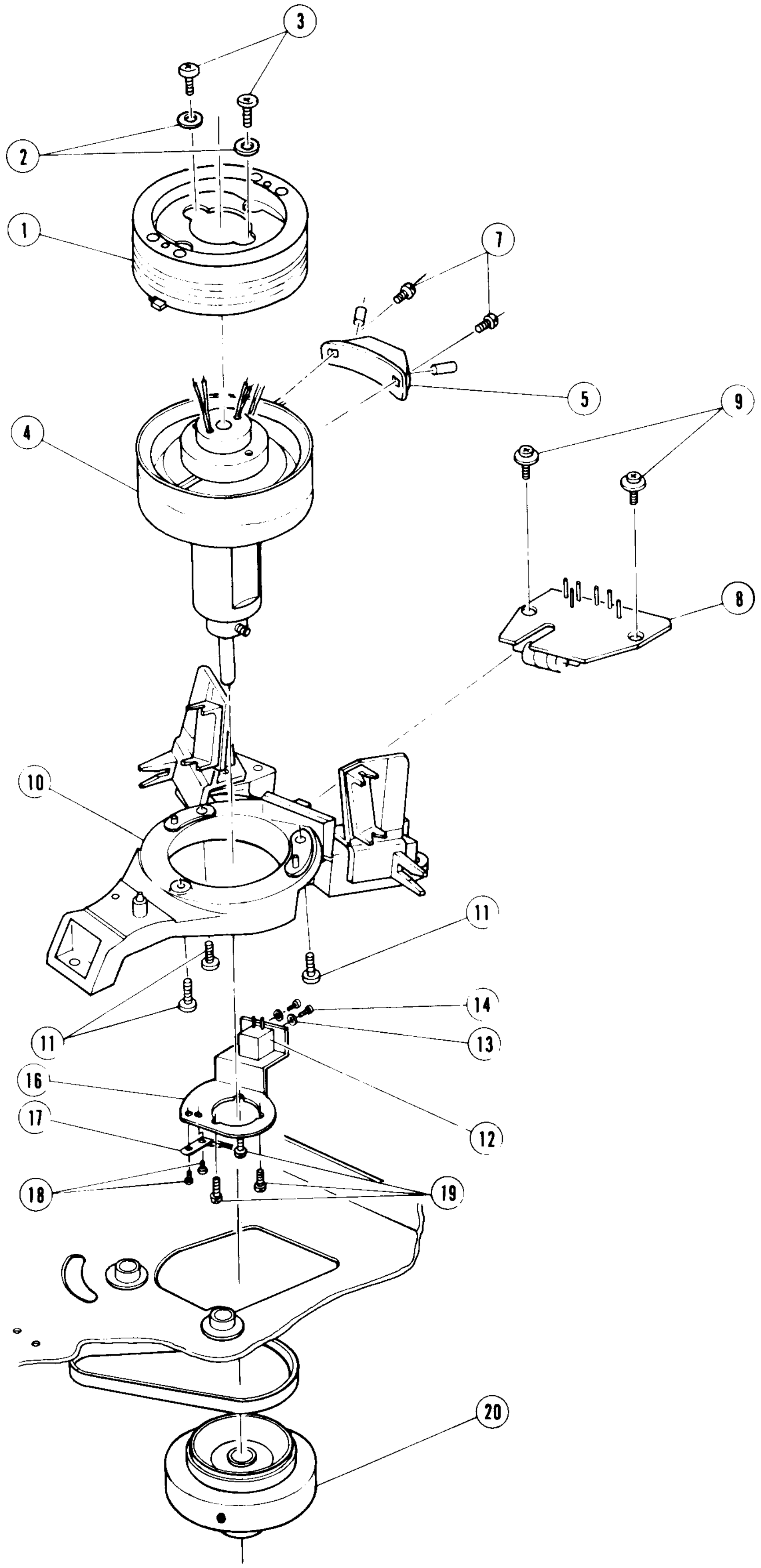
9.5 FUNCTION ASSEMBLY M 3



M 3 FUNCTION ASSEMBLY

Symbol No.	Part No.	Part Name	Remarks	Q'ty
1	PU44799	Lever		8
2	PU45800	Return Spring		8
3	PU44800	Lock Lever		1
4	PU44802	Flat Spring		2
5	DPSP3006ZS	Screw		2
6	REE3000	"E" Ring		2
7	PU31322	Function Plate (A)		1
8	PU44801	Shaft		1
9	PU20540	Button Case		1
10	PU35005-28	Spring		2
11	PU44231	Spring		1
12	PU31321-2	Swing Plate		1
13	PU35005-99	Spring		1
14	REE2500	"E" Ring	㉚ Function Ass'y	2
15	PU44806	Shaft		1
16	PU31323A	Function Plate (B) Ass'y		1
17	PU44803	Function Plate (C)	Note: Chenge them by	1
18	PU44805	Lock Plate (S)	Function Ass'y	1
19	PU44804	Lock Plate (L)	Except ⑳ ∿ ㉔	1
20	PU44808A	Button Ass'y (A)		4
21	PU44808B	" (B)		1
22	PU44808D	" (D)		1
23	PU44808E	" (E)		1
24	PU44808C	" (C)		1
25	PU45856	Function Plate (E)		1
26	PU45539	Function Plate (D)		1
27	REE2500	"E" Ring		2
28	PU35005-72	Spring		1
29	PU35005-22	Spring		1
30	PUS25490	Function Ass'y		–

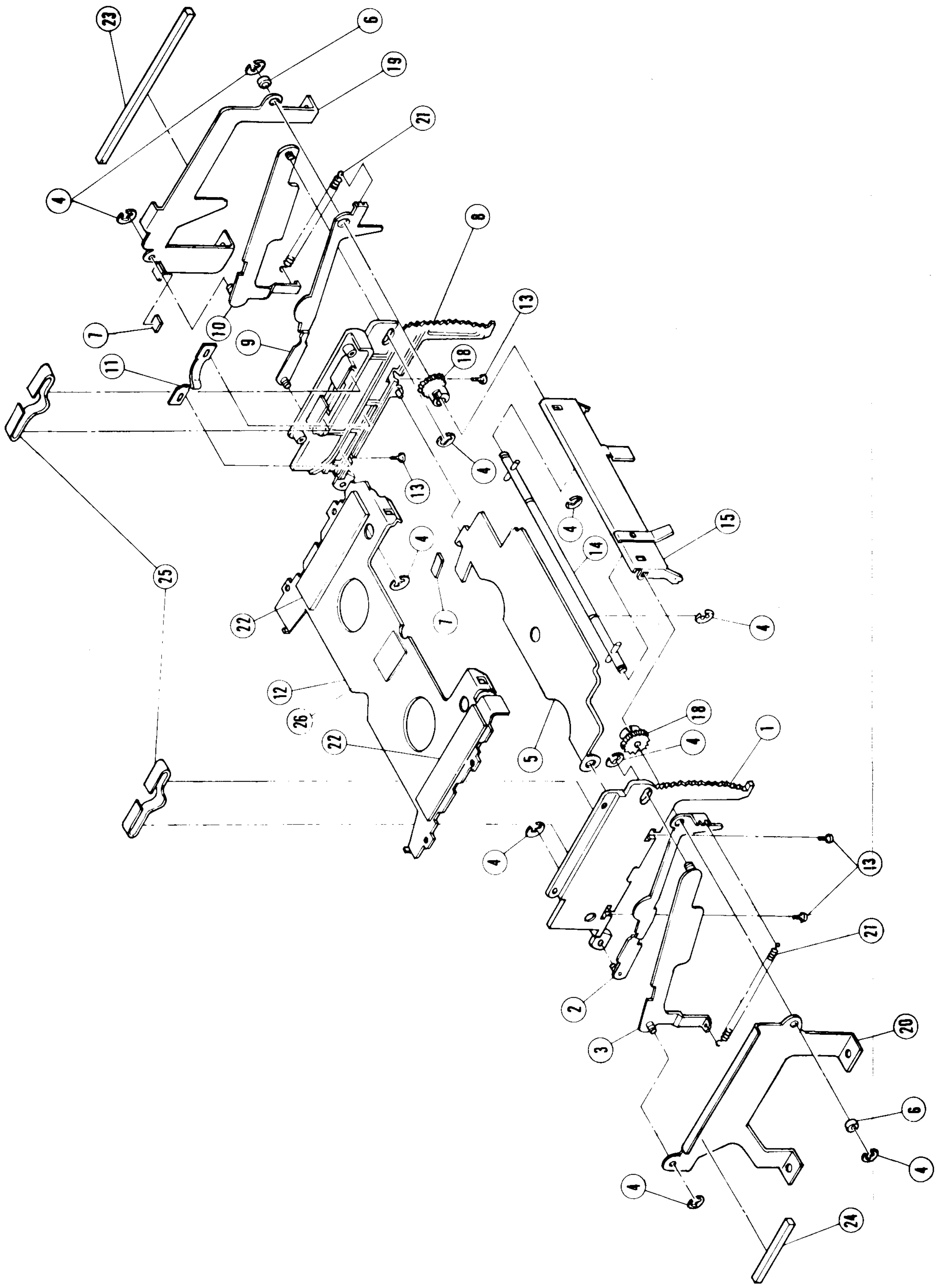
9.6 DRUM ASSEMBLY M 4



M 4 DRUM ASSEMBLY

Symbol No.	Part No.	Part Name	Remarks	Q'ty
1	PU31332D	Upper Drum Ass'y		1
2	WNB3000N	Washer		2
3	SPBP3010NS	Screw		2
4	PU31328D	Lower Drum Sub Ass'y	Incl: ㉑ Collar (PU44969)	1
5	PU44973A	Heater Ass'y		1
6	–	–		–
7	SDBP3006NS	Screw		2
8	–	Heater Circuit Board Ass'y	REF: 1 5	–
9	DPSP3006ZS	Screw		1
10	–	Drum Base Ass'y	Don't supply for Service Parts.	1
11	SDBP3008NS	Screw		3
12	PU47199	Pick-up Head		1
13	WSB2000N	Washer		2
14	SPBP2003N	Screw		2
15	–	–		–
16	PU44971	Pick-up Head Bracket		1
17	PU44972A	Brush Ass'y		1
18	SPBP2003N	Screw		2
19	LPSP2606Z	Screw		2
20	PU44965A	Drum Pulley Ass'y	Incl: Setscrew (YFS4006)	1
21	PU44969	Collar		1

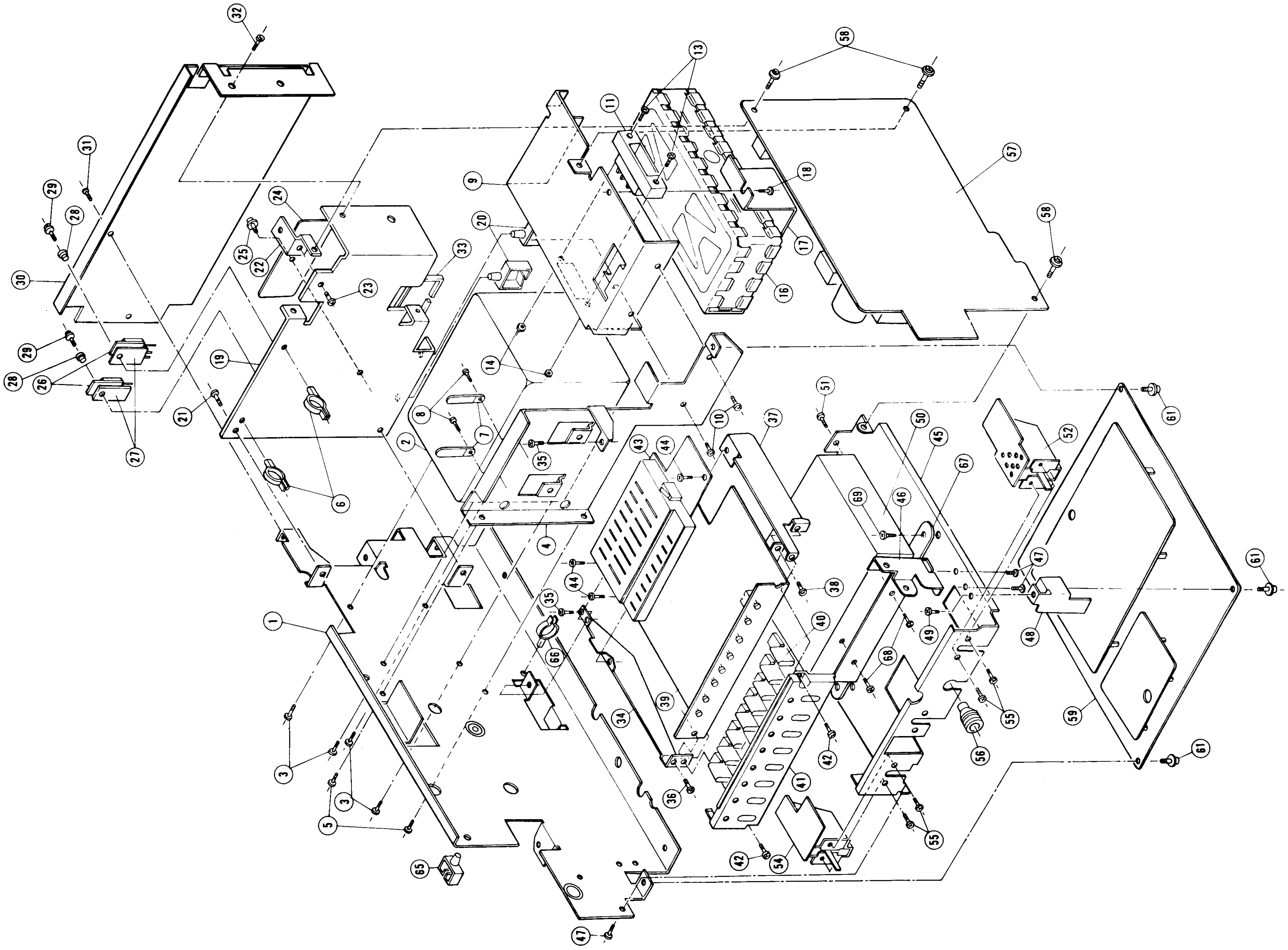
9.7 CASSETTE HOUSING ASSEMBLY M 5



M 5 CASSETTE HOUSING ASSEMBLY

Symbol No.	Part No.	Part Name	Remarks	Q'ty
1	PU20544	Housing	Left side	1
2	PU37336B	Lower Arm Ass'y	Left side	1
3	PU45360A	Upper Arm Ass'y	Left side	1
4	REE4000	"E" Ring		10
5	PU31338	Cover		1
6	PU43769-6	Collar		2
7	PU45673	Cushion		2
8	PU20543	Housing	Right side	1
9	PU31336A	Lower Arm Ass'y	Right side	1
10	PU45360B	Upper Arm Ass'y	Right side	1
11	PU45550	Off Spring		1
12	PU31337	Plate		1
13	LPSP2606Z	Screw	㉗ Cassette Housing Ass'y	4
14	PU45363A	Shaft Ass'y	Note: Chenge them	1
15	PU31491A	Lock Lever Ass'y	by Cassette Hausing Ass'y	1
16	–	–	Except ⑪ ㉕	–
17	–	–		–
18	PU45364	Gear		2
19	PU45358	Bracket	Right side	1
20	PU45909	Bracket	Left side	1
21	T30300-93	Spring		2
22	PU40867-2	Felt-1		2
23	PU45509-2	Shade		1
24	PU45509-3	Shade		1
25	PU45549	Spring		2
26	PU40867-3	Felt-2		1
27	PUS25491-0B	Cassette Holder Ass'y		–
–	DPSP3006ZS	Screw	for Setting Cassette Housing	4

9.8 TUNER ASSEMBLY M 6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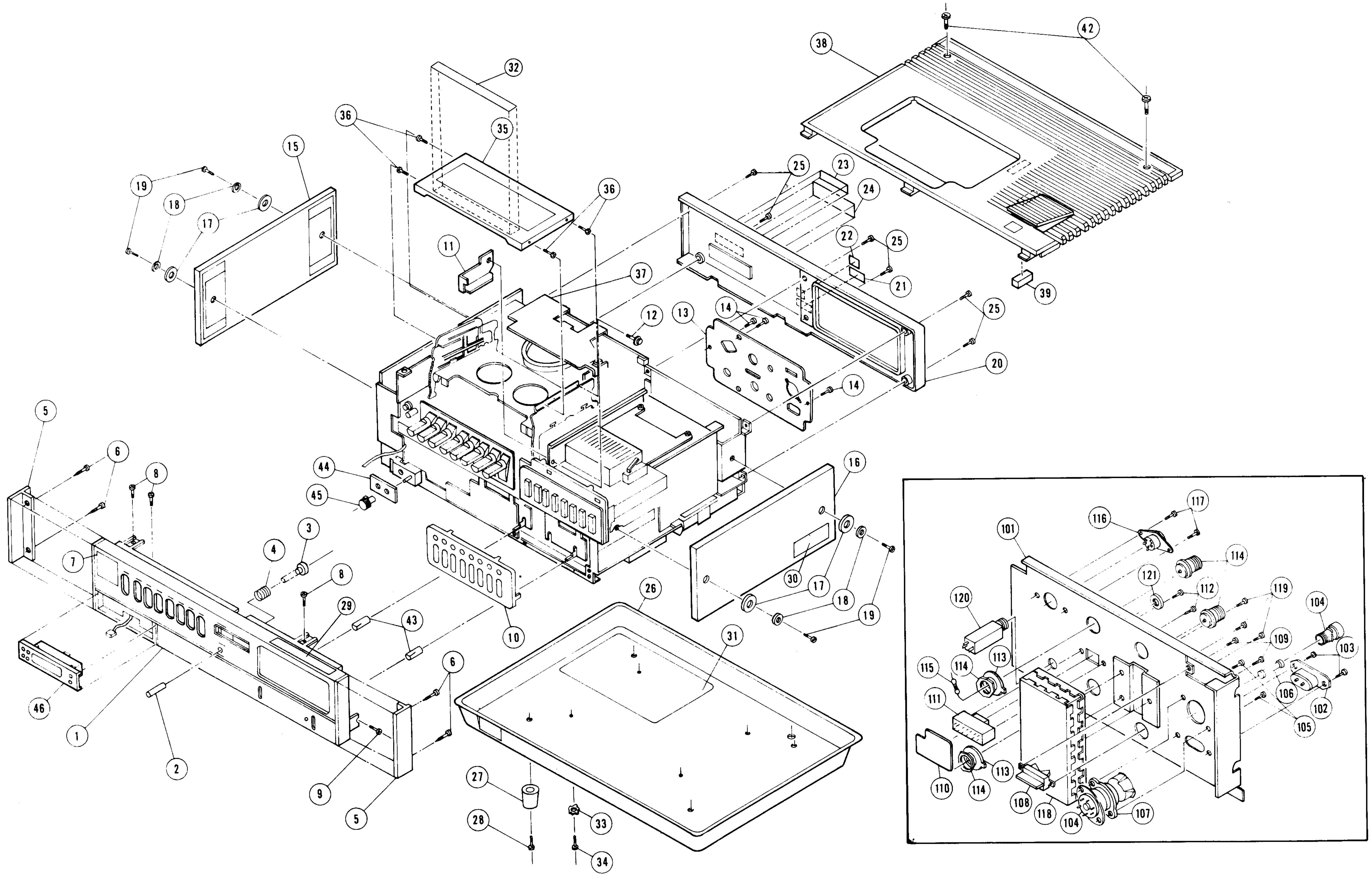
M6 TUNER ASSEMBLY

Symbol No.	Part No.	Part Name	Remarks	Q'ty
1	A27436C	Side Bracket		1
2	C39001B	Power Transformer		1
3	LPSP3006ZS	Screw		4
4	A38193D	Transformer Bracket		1
5	DPSP3006ZS	Screw		2
6	PU44816	Rod Holder		2
7	A75538A	Wire Clamp		2
8	LPSP3006ZS	Screw		2
9	PU31304-4	RF Holder (1)		2
10	LPSP3006ZS	Screw		2
11	PU45160	RF Connector		1
	QCF11HP-103	C. Cap	for +B	1
	QCS11HJ-5R0	〃	for RF Out	1
12	–	–		–
13	LPSP3012ZS	Screw		2
14	NNS3000NS	Nut		2
15	–	–		–
16	PU47155	UHF Converter	HR-3300EG	1
	PU47154	〃	HR-3300EK	1
17	PU44754-3	RF Holder (2)		1
18	C40500-1	Tap Screw		1
19	PU31505-5	Heat Sink		1
20	PU43147-2	Wire Saddle		2
21	LPSP3006ZS	Screw		2
22	PU44753-2	Bracket		1
23	C40500-1	Tap Screw		1
24	–	Power Transistor PWB	REF: 22	1
25	DPSP3006ZS	Screw		1
26	2SD3890	Power Transistor		2
27	PU45375-1	Spacer		2
28	PU41624-6	Insulator		2
29	LPSP3006ZS	Screw		2
30	–	Terminal Bracket	REF: M7	–
31	LPSP3006ZS	Screw		1
32	C40500-1	Tap Screw		1
33	PU44157	Edge Saddle		1
34	A27433	Senser PWB Bracket	Left Side	1
35	DPSP3008ZS	Screw		2
36	LPSP3006Z	〃		1
37	A38172	Senser PWB Bracket	Right Side	1
38	LPSP3006ZS	Screw		1
39	–	CH Selector PWB Ass'y	REF: 27	1
40	C40534	Senser Knob		8
41	A27437-1	Senser Panel		1
42	C40500-1	Tap Screw		2
43	–	Presetter PWB Ass'y	REF: 28	1
44	C40627	Tap Screw		3
45	A27432-2	Switch Bracket		1
46	C40540-2	Panel Bracket		1
47	C40500-1	Tap Screw		2
48	C40606	Bracket		1
49	C40500-1	Tap Screw		1
50	EM6531FS-A01	UHF Tuner	HR-3300EG E	1
	UEM966AZ-A01	〃	HR-3300EK 〃	1
51	LPSP3006ZS	Screw		2
52	–	Function SW PWB Ass'y	REF: 10	1
53	–	–		–
54	–	Input SW PWB Ass'y	REF: 11	1
55	LPSP3006ZS	Screw		4
56	PU44751	Lamp Bush		1
57	–	Regulator PWB Ass'y	REF: 02	1
58	C40500-1	Tap Screw		3
59	–	Tuner PWB Ass'y	REF: 03	1
60	–	–		–
61	C40627	Tap Screw		3
62	–	–		–
63	–	–		–
64	–	–		–
65	PU43147-2	Wire Clip		1
66	PU44816	Rod Holder		1
67	C41092	Tuner Bracket		1
68	LPSP3006Z	Screw		2
69	C40500-1	Tap Screw		2

9.9 CABINET ASSEMBLY M 7



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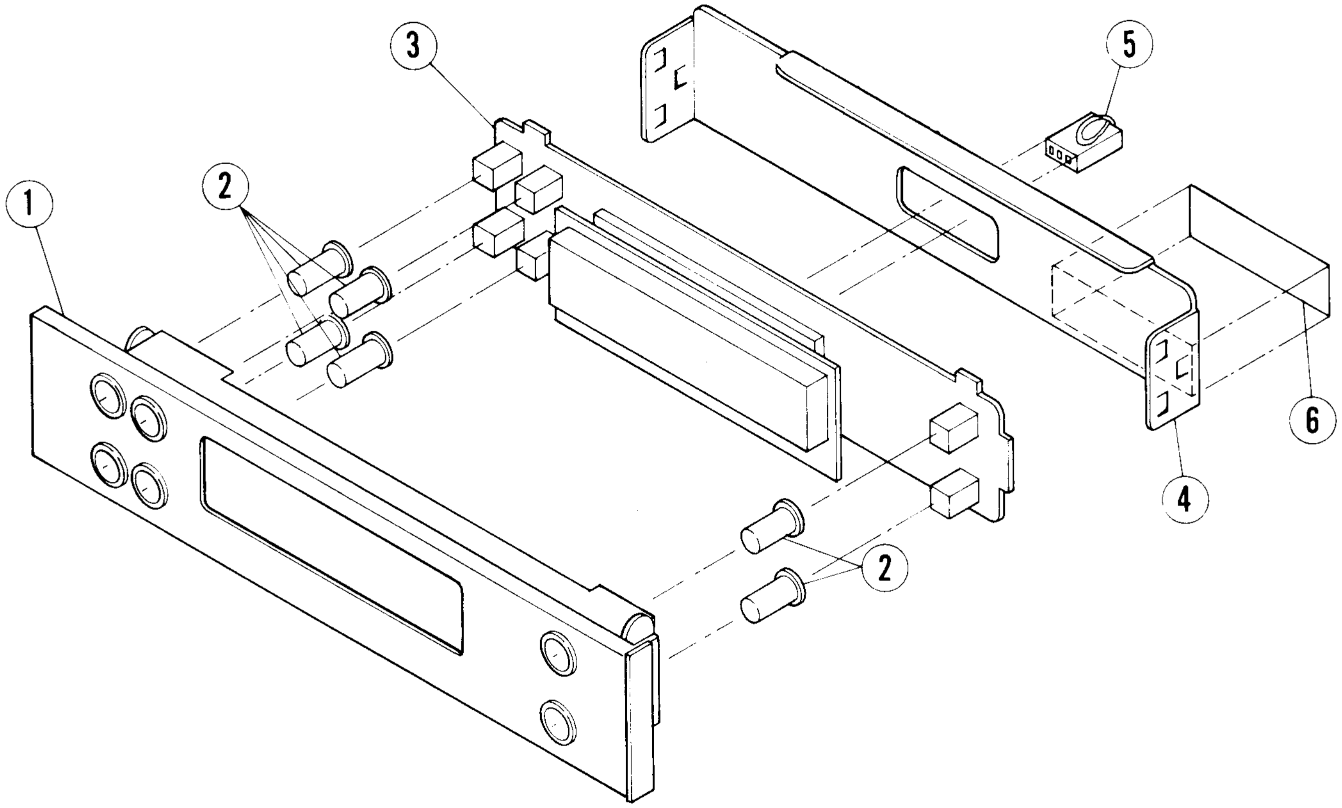
M 7 CABINET ASSEMBLY

Symbol No.	Part No.	Part Name	Description	Q'ty
1	PU10193A	Front Cover Ass'y		1
2	PU44731	Knob (1)		1
3	PU44758	Knob (2)		1
4	PU30080-50	Spring		1
5	PU46000	Side Fitting		2
6	SDSA3008Z	Tap. Screw		4
7	PU46141	Mark		1
8	DPSP3008ZS	Screw		3
9	DPSP3006ZS	″		1
10	PU31600-3	Sensor Plate		1
11	PU47126	Stopper		1
12	DPSP3006ZS	Screw		1
13	PU31925	Terminal Plate		1
14	SDBP3006MS	Screw		4
15	PU31709A	Side Plate Ass'y	Left Side	1
16	PU20641-2	Side Plate	Right Side	1
17	PU46788	Black Washer		4
18	Q03093-814	Washer		4
19	SDBP3014MS	Screw		4
20	PU10126	Rear Cover		1
21	PU46789	Sticker	HR-3300EK	1
22	PU46387	″	HR-3300EK	1
23	PU42075	Label		1
24	PU31054-96	Serial No. Plate	HR-3300EG	1
	PU31054-97	″	HR-3300EK	
25	SDBP3006MS	Screw		6
26	PU10095-4	Bottom Cover		1
27	PU44756	Foot		4
28	LPSP3010ZS	Screw		4
29	PU46544	Sticker	HR-3300EK	1
30	PU46070-3	RF Sticker		1
31	PU46681	Insulator		1
32	PU45968	Label		1
33	WBS3000N	Lock Washer		4
34	DPSP3006ZS	Screw		4
35	PU31564G	Cassette Cover Ass'y		1
36	SDSA3008B	Tap. Screw		4
37	PU31923	Shield Cover		1
38	PU10129H	Top Panel Ass'y		1
39	PU45509	Shade		1
40	–	–		–
41	–	–		–
42	SDBP3006BS	Screw		2
43	PU44732-2	Knob		2
44	PU45998	Mic Panel		1
45	PU43892	Knob	For Tracking Control	1
46	–	Timer Ass'y	REF: M 8	1
101	A27438G	Terminal Bracket Ass'y		1
102	QMC9017-001	AC Inlet		1
103	SSSP3008ZS	Screw		2
104	PU45383-2	Voltage Selector		1
105	LPSP3010ZS	Screw		2
106	QMF51A2-1R0	Fuse		1
107	C40621-2	Cover		1
108	QSE2135-001	Seesaw Switch		1
109	LPSP3006Z	Screw		2
110	–	P.W. Board	REF: 3 0	1
111	AX49357	Selector Switch		1
112	SPSP2605Z	Screw		2
113	GU45074	Earth Lug		2
114	GU45073-2	Connector		2
115	QRD141K-750	C. Resistor	for Video In	1
116	QMC0589-001	DIN Connector		1
117	LPSP3006Z	Screw		2
118	MB-1	MIX Booster	HR-3300EG (Should be changed by assembly)	1
	MB-2	″	HR-3300EK (″)	1
119	LPSP3006Z	Screw		3
120	QMS3501-009	Remote Jack		1
121	A48714	Nut		1

9.10 TIMER ASSEMBLY M 8



M 8 TIMER ASSEMBLY **PUS25682K**

Symbol No.	Part No.	Part Name	Description	Q'ty
1	PU31877D	Timer Cover Ass'y		1
2	PU47042	Knob		6
3	–	Timer PWB Ass'y	REF: 2 5	1
4	PU32003	Rear Cover		1
5	ML-PU0966-1	Socket Ass'y		1
6	PU42091	No. Plate		1

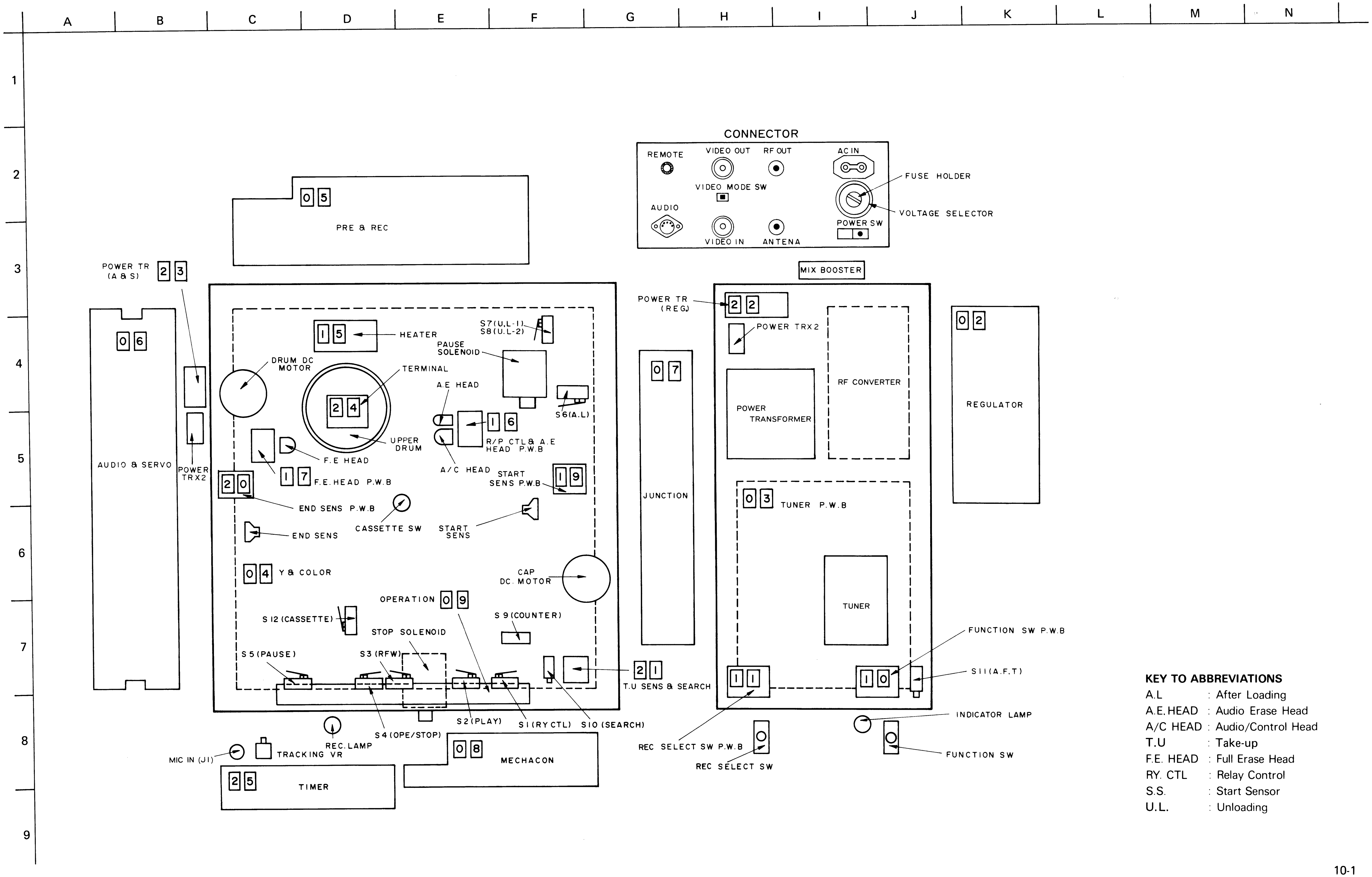
9.11 ACCESSORY $\boxed{M}$ $\boxed{9}$

$\boxed{M}$ $\boxed{9}$ ACCESSORY

Symbol No.	Part No.	Part Name	Description	Q'ty
1	QMP3950-183(V)	Power Cord	HR-3300EG	1
	PU46128-BS	"	HR-3300EK	1
2	PU43294F	Aerial Cable Ass'y	HR-3300EG	1
	PU46791	"	HR-3300EK	1
3	PU46311U	Remote Control SW		1
4	QPGA020-03005	Poly Bag	for ① – ③	1
5	PTE-30	Video Cassette		1
6	PU31773-6	Instruction Book	HR-3300EG	1
	PU30425-246	"	HR-3300EK	1
7	PU31773-6	Dust Cover		1
8	QPGA025-03005	Poly Bag	for ⑦	1
9	QPGA025-03005	"	for ⑥ – ⑧	1

SECTION 10
CHARTS AND DIAGRAMS

10.1 ELECTRICAL PARTS LOCATION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F
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J
K
L
M
N
1
2
3
4
5
6
7
8
9
CONNECTOR
REMOTE
VIDEO OUT
RF OUT
AC IN
FUSE HOLDER
VIDEO MODE SW
AUDIO
VOLTAGE SELECTOR
POWER SW
VIDEO IN
ANTENNA
05
PRE & REC
POWER TR (A & S)
23
MIX BOOSTER
POWER TR (REG)
22
POWER TRX2
02
06
15
HEATER
S7(U.L-1)
S8(U.L-2)
PAUSE SOLENOID
DRUM DC MOTOR
TERMINAL
07
RF CONVERTER
24
A.E HEAD
POWER TRANSFORMER
REGULATOR
16
S6(A.L)
R/P CTL & A.E HEAD P.W.B
UPPER DRUM
F.E HEAD
AUDIO & SERVO
POWER TRX2
A/C HEAD
START SENS P.W.B
19
20
17
F.E.HEAD P.W.B
JUNCTION
03
TUNER P.W.B
END SENS P.W.B
CASSETTE SW
START SENS
END SENS
04
Y & COLOR
CAP DC. MOTOR
TUNER
OPERATION
09
S 12 (CASSETTE)
S 9 (COUNTER)
STOP SOLENOID
FUNCTION SW P.W.B
S 5 (PAUSE)
S 3 (RFW)
21
T.U SENS & SEARCH
11
10
S 11 (A.F.T)
INDICATOR LAMP
S 2 (PLAY)
S 1 (RY CTL)
S 10 (SEARCH)
S 4 (OPE/STOP)
REC.LAMP
REC SELECT SW P.W.B
FUNCTION SW
08
MECHACON
MIC IN (J1)
TRACKING VR
REC SELECT SW
25
TIMER

KEY TO ABBREVIATIONS

A.L	: After Loading
A.E.HEAD	: Audio Erase Head
A/C HEAD	: Audio/Control Head
T.U	: Take-up
F.E. HEAD	: Full Erase Head
RY. CTL	: Relay Control
S.S.	: Start Sensor
U.L.	: Unloading

10.2 OVERALL WIRING

A B C D E F G H I J K L M N

1 2 3 4 5 6 7 8 9

Key to abbreviations

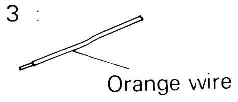
A : Audio
A.E. HEAD : Audio Erase Head
A.L. : After Loading
CAP. : Capstan
COL. : Color
CTL. : Control
D. : Drum
DL. EQ : Delay Equalizer
D.P. HEAD : Drum Pulse Head
E.S. : End Sensor
F.E. HEAD : Full Erase Head
F.F. : Flip-Flop
G. : Ground
P.B. : Playback
R/P HEAD : Record/Playback Head
RY. CTL. : Relay Control
SEL. : Select
SOL. : Solenoid
S.S. : Start Sensor
TR : Transistor
T.U. S. : Take-Up Sensor
UL. : Unloading
V : Video

Color Code

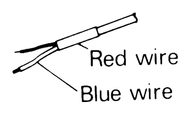
0	Black
1	Brown
2	Red
3	Orange
4	Yellow
5	Green
6	Blue
7	Violet
8	Gray
9	White

Color Code

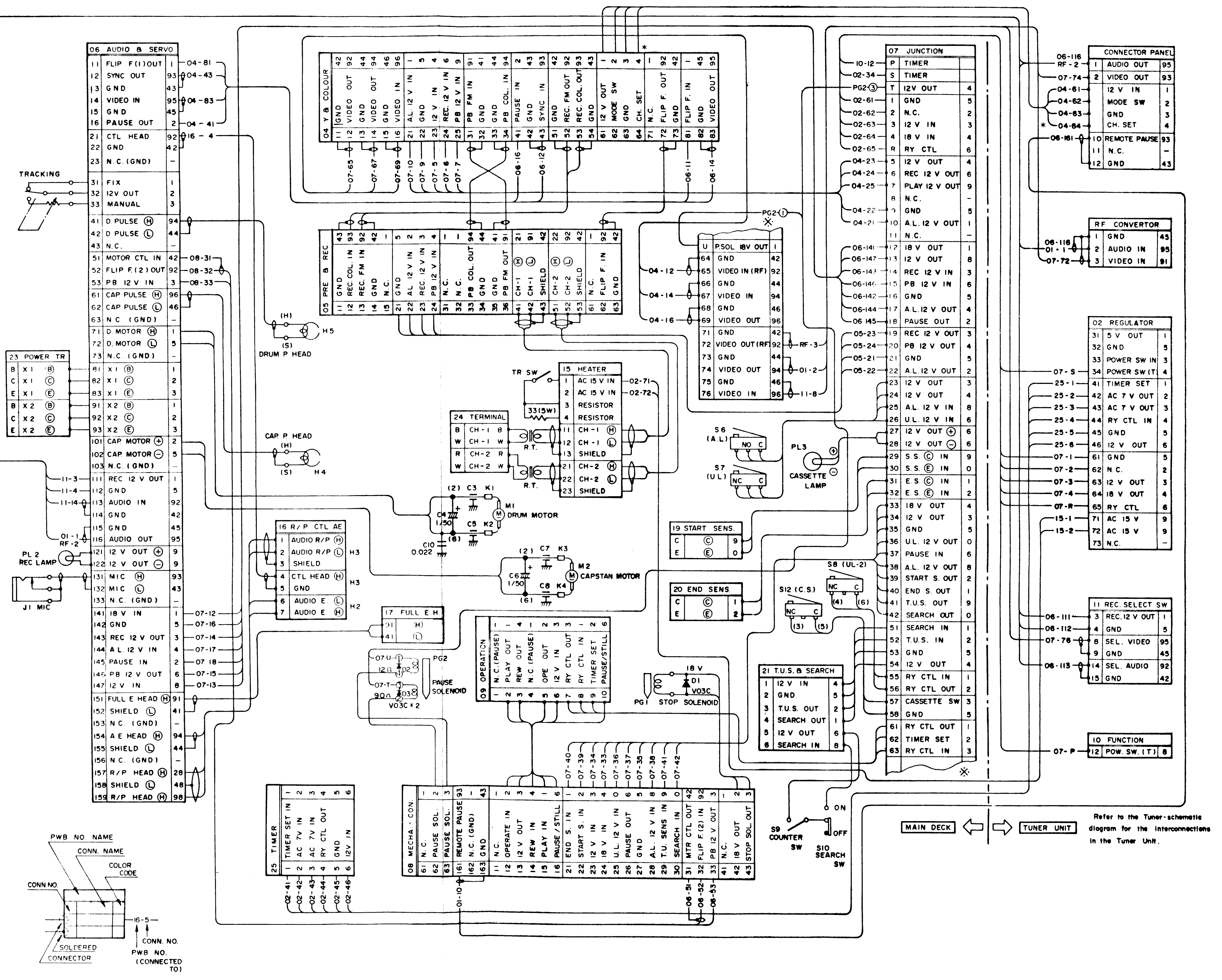
3 :


Orange wire

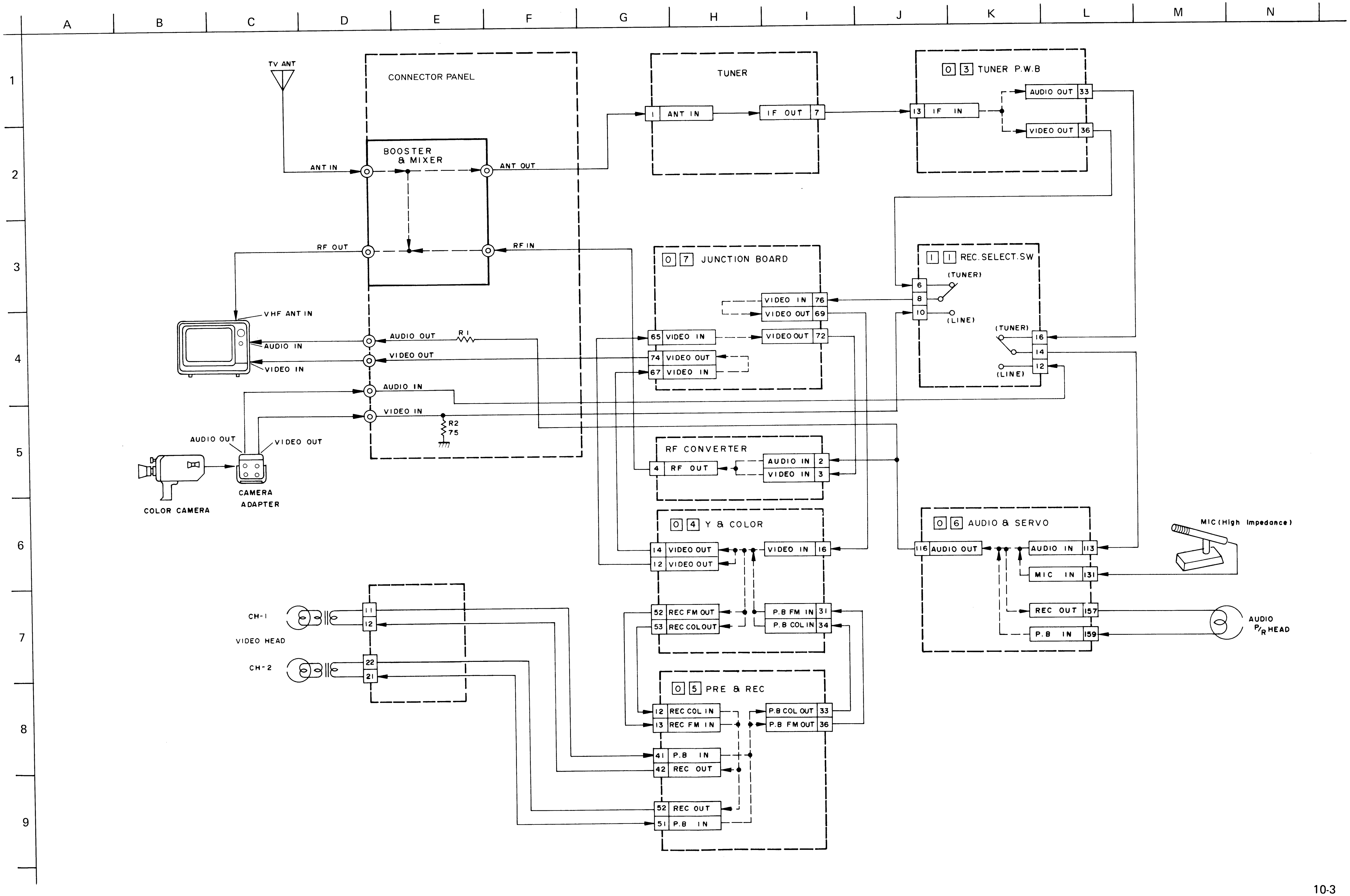
62 :


Red wire
Blue wire

PWB NO.	P.W.B. NAME
01	————
02	REGULATOR
03	TUNER P.W.B.
04	Y & COLOR
05	PRE & REC
06	AUDIO & SERVO
07	JUNCTION BOARD
08	MECHA - CON
09	OPERATION
10	FUNCTION SW.
11	REC SECT SW.
12	————
13	————
14	————
15	HEATER
16	R/P, CTL, A.E. HEAD
17	FULL ERASE HEAD
18	————
19	START SENSER
20	END SENSER
21	TAKE UP SENS & SEARCH
22	POW. TRANSISTOR (REG)
23	POW. TRANSISTOR (A/S)
24	TERMINAL
25	TIMER
26	————
27	CH. SELECTOR
28	PRE - SETTER
29	TUNER PARTS
30	MODE SW


06 AUDIO & SERVO
07 JUNCTION
04 Y & COLOUR
05 PRE & REC
23 POWER TR
24 TERMINAL
15 HEATER
16 R/P CTL AE
17 FULL E.H.
09 OPERATION
08 MECHA - CON.
25 TIMER
19 START SENS.
20 END SENS.
21 T.U.S. & SEARCH
CONNECTOR PANEL
RF CONVERTOR
02 REGULATOR
11 REC. SELECT SW
10 FUNCTION
TRACKING
DRUM P HEAD
CAP. P HEAD
PL 2 REC LAMP
J1 MIC
TR SW
M1 DRUM MOTOR
M2 CAPSTAN MOTOR
PAUSE SOLENOID
PG1 STOP SOLENOID
S6 (A.L)
S7 (U.L)
PL3 CASSETTE LAMP
S8 (UL-2)
S12 (C.S)
S9 COUNTER SW
S10 SEARCH SW
ON
OFF
MAIN DECK
TUNER UNIT
Refer to the Tuner-schematic diagram for the interconnections in the Tuner Unit.
PWB NO. NAME
CONN. NAME
COLOR CODE
CONN.NO.
SOLDERED CONNECTOR
CONN. NO.
PWB NO. (CONNECTED TO)

10.3 SIGNAL LINE


A
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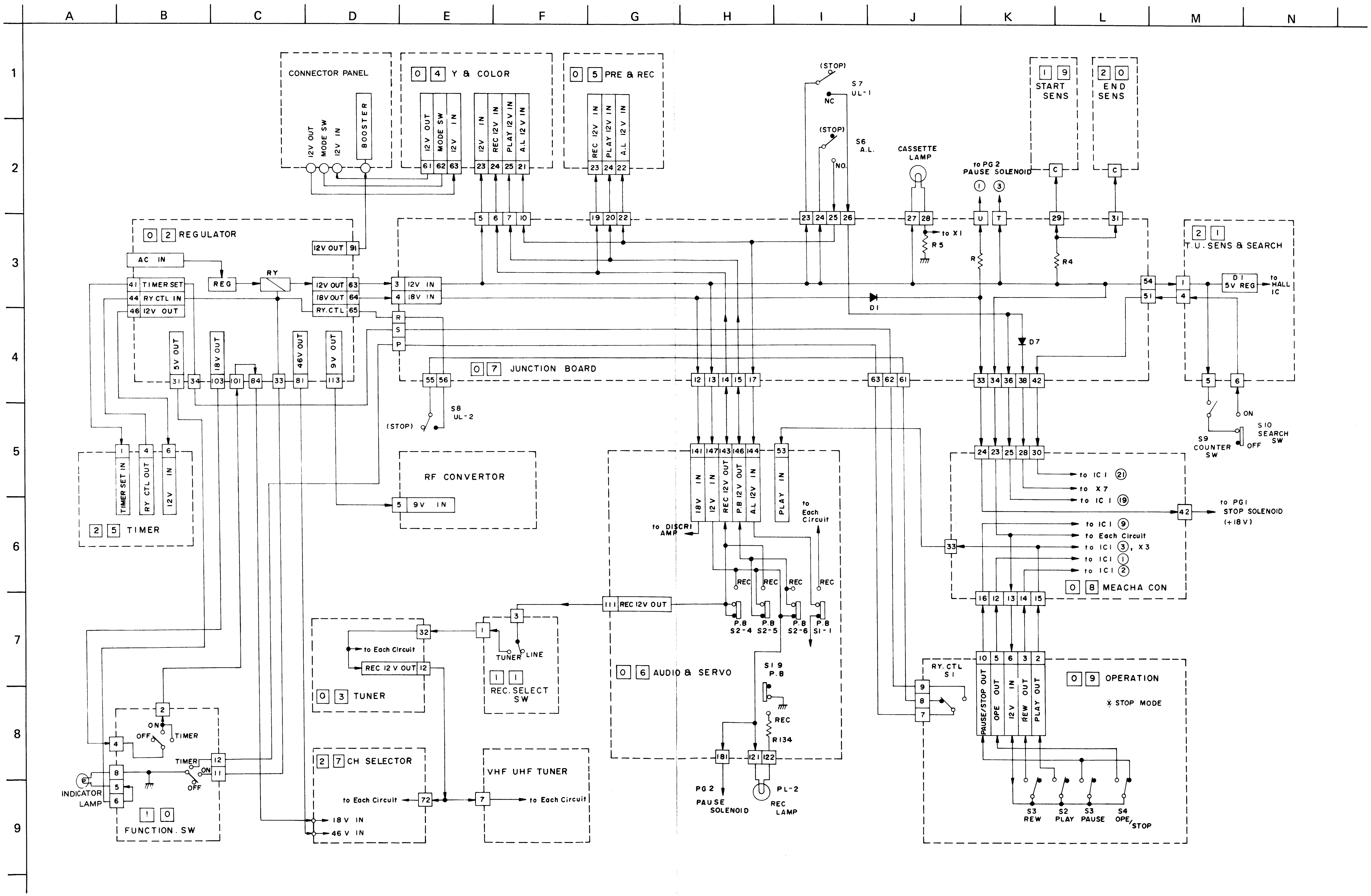
7
8
9
TV ANT
CONNECTOR PANEL
BOOSTER & MIXER
ANT IN
ANT OUT
RF OUT
RF IN
TUNER
1 ANT IN
IF OUT 7
03 TUNER P.W.B
13 IF IN
AUDIO OUT 33
VIDEO OUT 36
07 JUNCTION BOARD
VIDEO IN 76
VIDEO OUT 69
65 VIDEO IN
VIDEO OUT 72
74 VIDEO OUT
67 VIDEO IN
11 REC. SELECT. SW
(TUNER)
6
8
10
(LINE)
(TUNER)
16
14
12
(LINE)
VHF ANT IN
AUDIO IN
VIDEO IN
AUDIO OUT
R1
VIDEO OUT
AUDIO IN
VIDEO IN
R2
75
AUDIO OUT
VIDEO OUT
COLOR CAMERA
CAMERA ADAPTER
RF CONVERTER
AUDIO IN 2
VIDEO IN 3
4 RF OUT
04 Y & COLOR
14 VIDEO OUT
12 VIDEO OUT
VIDEO IN 16
52 REC FM OUT
53 REC COL OUT
P.B FM IN 31
P.B COL IN 34
06 AUDIO & SERVO
116 AUDIO OUT
AUDIO IN 113
MIC IN 131
REC OUT 157
P.B IN 159
MIC (High Impedance)
AUDIO P/R HEAD
CH-1
VIDEO HEAD
CH-2
11
12
22
21
05 PRE & REC
12 REC COL IN
13 REC FM IN
P.B COL OUT 33
P.B FM OUT 36
41 P.B IN
42 REC OUT
52 REC OUT
51 P.B IN

10.4 +B LINE


A
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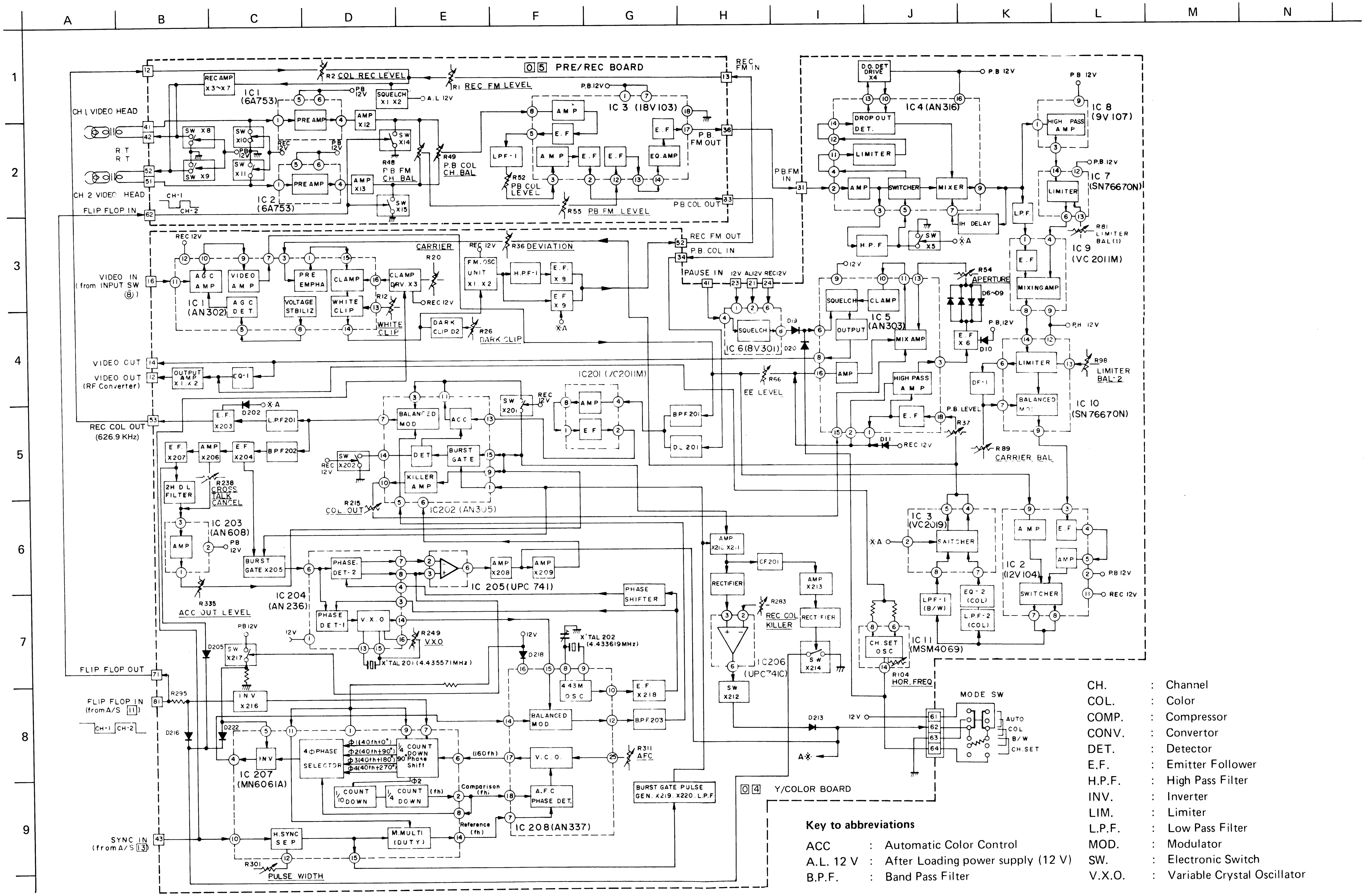
5
6
7
8
9
CONNECTOR PANEL
12V OUT
MODE SW
12V IN
BOOSTER
04 Y & COLOR
12V OUT
MODE SW
12V IN
61 62 63
12V IN
REC 12V IN
PLAY 12V IN
A.L 12V IN
23 24 25 21
05 PRE & REC
REC 12V IN
PLAY 12V IN
A.L 12V IN
23 24 22
(STOP)
S7
UL-1
NC
(STOP)
S6
A.L.
NO.
CASSETTE LAMP
to PG2
PAUSE SOLENOID
①
③
19
START SENS
20
END SENS
C
C
02 REGULATOR
12V OUT 91
AC IN
41 TIMER SET
44 RY CTL IN
46 12V OUT
REG
RY
12V OUT 63
18V OUT 64
RY.CTL 65
5V OUT
18V OUT
46V OUT
9V OUT
31 34 103 101 84 33 81 113
5 6 7 10
19 20 22
23 24 25 26
27 28
to X1
R5
U
T
29
31
R
R4
3 12V IN
4 18V IN
R
S
P
D1
D7
54
51
21
T.U. SENS & SEARCH
1
4
D1
5V REG
to HALL IC
07 JUNCTION BOARD
55 56
12 13 14 15 17
63 62 61
33 34 36 38 42
5
6
S8
UL-2
(STOP)
ON
S10
SEARCH SW
S9
COUNTER SW
OFF
1 4 6
TIMER SET IN
RY CTL OUT
12V IN
25 TIMER
RF CONVERTOR
5 9V IN
141 147 143 146 144
18V IN
12V IN
REC 12V OUT
P.B 12V OUT
A.L 12V IN
53
PLAY IN
to Each Circuit
to DISCRI AMP
24 23 25 28 30
to IC1 ㉑
to X7
to IC1 ⑲
42
to PG1
STOP SOLENOID
(+18V)
to IC1 ⑨
to Each Circuit
33
to IC1 ③, X3
to IC1 ①
to IC1 ②
08 MEACHA CON
16 12 13 14 15
REC
REC
REC
REC
111 REC 12V OUT
P.B
S2-4
P.B
S2-5
P.B
S2-6
P.B
S1-1
3
1
TUNER
LINE
11 REC.SELECT SW
32
to Each Circuit
REC 12 V OUT 12
03 TUNER
06 AUDIO & SERVO
S19
P.B
REC
R134
181
121 122
PG2
PAUSE SOLENOID
PL-2
REC LAMP
RY. CTL
S1
9
8
7
10 5 6 3 2
PAUSE/STOP OUT
OPE OUT
12V IN
REW OUT
PLAY OUT
09 OPERATION
※ STOP MODE
S3
REW
S2
PLAY
S3
PAUSE
S4
OPE/STOP
2
ON
OFF
TIMER
4
8
5
6
TIMER
ON
OFF
12
11
INDICATOR LAMP
10 FUNCTION. SW
27 CH SELECTOR
to Each Circuit
72
18V IN
46V IN
VHF UHF TUNER
7
to Each Circuit

10.5 VIDEO SYSTEM BLOCK DIAGRAM



A
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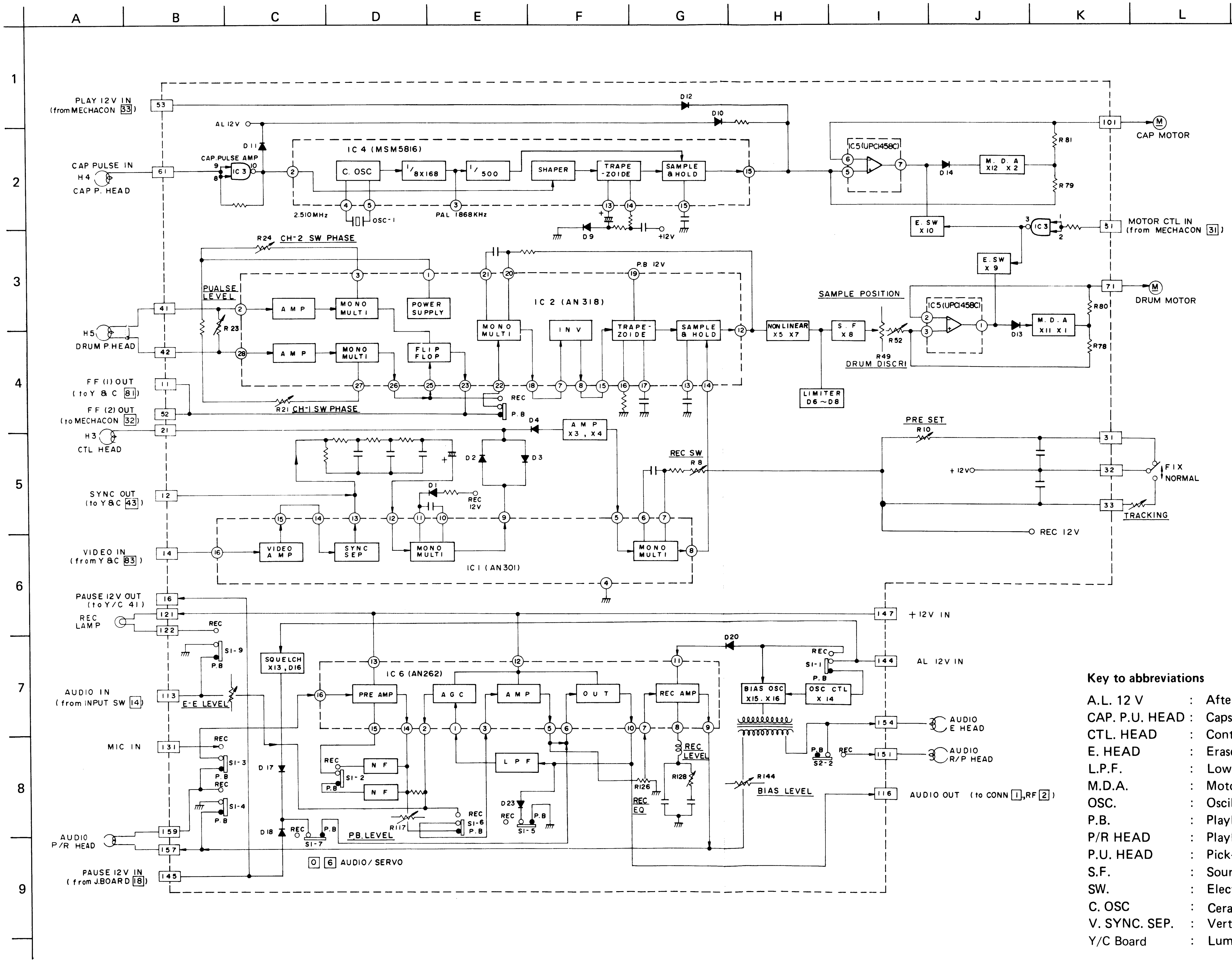
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
05 PRE/REC BOARD
04 Y/COLOR BOARD
CH 1 VIDEO HEAD
CH 2 VIDEO HEAD
R T
FLIP FLOP IN
REC AMP X3~X7
IC 1 (6A753)
IC 2 (6A753)
PRE AMP
AMP X12
AMP X13
SQUELCH X1 X2
A.L 12V
R2 COL REC LEVEL
R1 REC FM LEVEL
IC 3 (18V103)
R48 P.B FM CH. BAL
R49 P.B COL CH. BAL
R52 PB COL LEVEL
R55 PB FM LEVEL
LPF-1
EQ AMP
P.B FM OUT
PB COL OUT
REC FM IN
REC FM OUT
P.B COL IN
PAUSE IN
VIDEO IN (from INPUT SW ⑧)
IC 1 (AN302)
AGC AMP
VIDEO AMP
AGC DET
PRE EMPHA
VOLTAGE STBILIZ
CLAMP
WHITE CLIP
CLAMP DRV X3
CARRIER R20
R36 DEVIATION
FM OSC UNIT X1 X2
H.P.F-1
DARK CLIP D2
R26 DARK CLIP
VIDEO OUT
VIDEO OUT (RF Converter)
OUTPUT AMP X1 X2
EQ-1
REC COL OUT (626.9 KHz)
L.P.F201
B.P.F202
IC201 (VC2011M)
IC202 (AN305)
BALANCED MOD
ACC
DET
BURST GATE
KILLER AMP
R215 COL OUT
2H DL FILTER
R238 CROSS TALK CANCEL
IC 203 (AN608)
R335 ACC OUT LEVEL
BURST GATE X205
IC 204 (AN 236)
PHASE DET-2
PHASE DET-1
V.X.O
R249 V.X.O
X'TAL 201 (4.435571MHz)
IC 205 (UPC 741)
PHASE SHIFTER
X'TAL 202 (4.433619MHz)
4.43M OSC
BALANCED MOD
V.C.O.
A.F.C PHASE DET.
IC 208 (AN337)
R311 AFC
BURST GATE PULSE GEN. X219, X220, L.P.F
IC 207 (MN6061A)
4Φ PHASE SELECTOR
1/4 COUNT DOWN 90° Phase Shift
1/10 COUNT DOWN
1/4 COUNT DOWN
Comparison (fh)
Reference (fh)
H.SYNC SEP
M.MULTI (DUTY)
R301 PULSE WIDTH
SYNC IN (from A/S ⑬)
FLIP FLOP OUT
FLIP FLOP IN (from A/S ⑪)
CH-1 CH-2
EE LEVEL R66
P.B FM IN
IC 4 (AN316)
D.O. DET DRIVE X4
DROP OUT DET.
LIMITER
SWITCHER
MIXER
1H DELAY
H.P.F
SW X5
IC 6 (8V301)
SQUELCH
IC 5 (AN303)
OUTPUT
MIX AMP
HIGH PASS AMP
R54 APERTURE
D6~D9
IC 8 (9V107)
IC 7 (SN76670N)
R81 LIMITER BAL (1)
IC 9 (VC2011M)
MIXING AMP
R98 LIMITER BAL-2
IC 10 (SN76670N)
BALANCED MOD
R89 CARRIER BAL
R37
IC 3 (VC2019)
IC 2 (12V104)
LPF-1 (B/W)
EQ-2 (COL)
L.P.F-2 (COL)
RECTIFIER
R283 REC COL KILLER
IC206 (UPC741C)
RECT FIER
CF 201
IC 11 (MSM4069)
CH. SET OSC
R104 HOR. FREQ
MODE SW
AUTO
COL
B/W
CH. SET

Key to abbreviations

ACC	:	Automatic Color Control
A.L. 12 V	:	After Loading power supply (12 V)
B.P.F.	:	Band Pass Filter
CH.	:	Channel
COL.	:	Color
COMP.	:	Compressor
CONV.	:	Convertor
DET.	:	Detector
E.F.	:	Emitter Follower
H.P.F.	:	High Pass Filter
INV.	:	Inverter
LIM.	:	Limiter
L.P.F.	:	Low Pass Filter
MOD.	:	Modulator
SW.	:	Electronic Switch
V.X.O.	:	Variable Crystal Oscillator

10.6 AUDIO AND SERVO BLOCK DIAGRAM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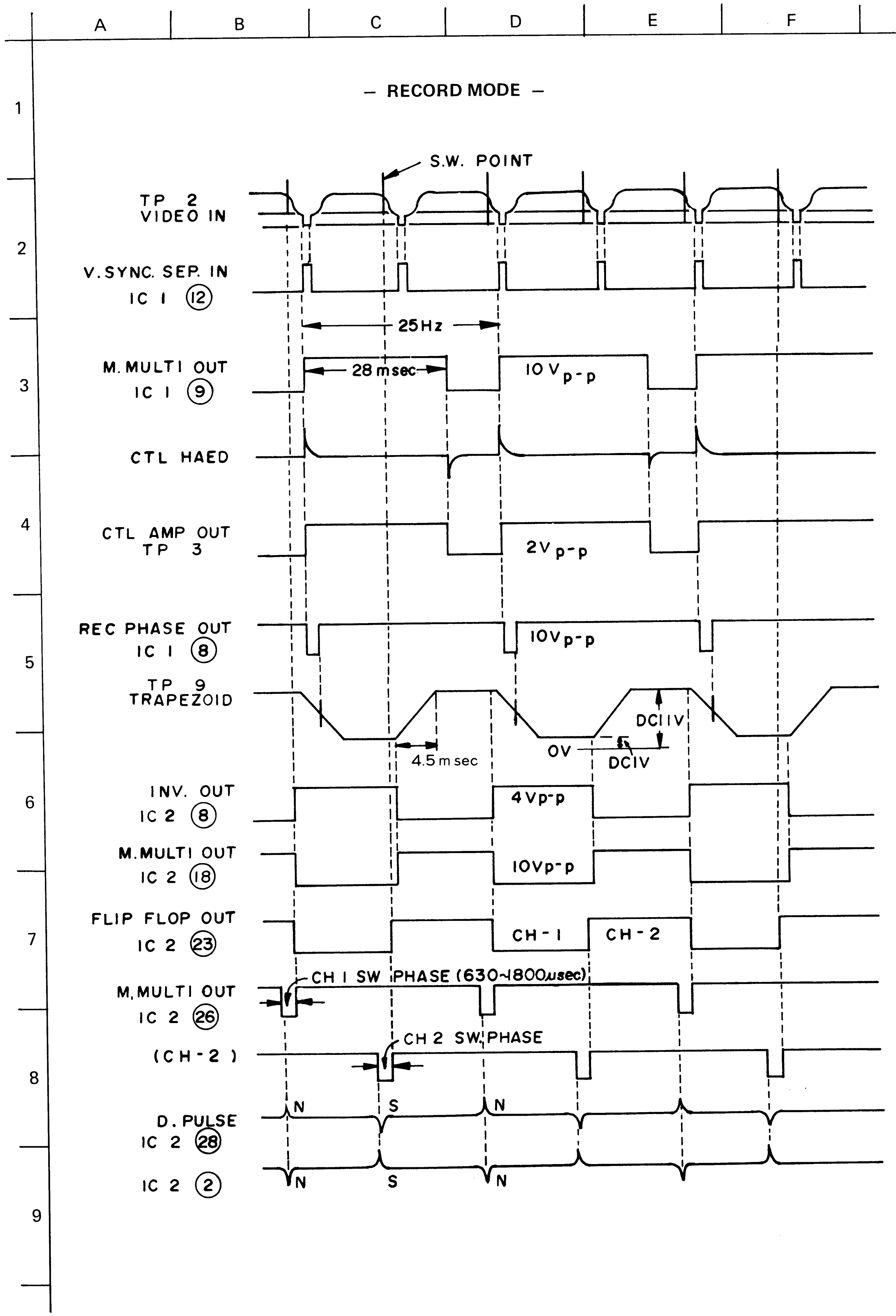
6
7
8
9
PLAY 12V IN (from MECHACON 33)
53
D12
D10
AL 12V
D11
CAP PULSE AMP
IC 3
IC 4 (MSM5816)
C. OSC
1/8x168
1/500
SHAPER
TRAPE -ZOIDE
SAMPLE & HOLD
2.510MHz
OSC-1
PAL 1868KHz
D9
+12V
CAP PULSE IN
H4
CAP P. HEAD
61
IC5(UPC1458C)
M. D. A X12 X2
D14
R81
R79
101
CAP MOTOR
E. SW X10
E. SW X9
IC3
MOTOR CTL IN (from MECHACON 31)
51
R24 CH-2 SW PHASE
PUALSE LEVEL
R 23
AMP
MONO MULTI
POWER SUPPLY
FLIP FLOP
IC 2 (AN 318)
INV
TRAPE-ZOIDE
SAMPLE & HOLD
P.B 12V
NON LINEAR X5 X7
S. F X8
SAMPLE POSITION
R52
R49
DRUM DISCRI
IC5(UPC1458C)
D13
M. D. A X11 X1
R80
R78
71
DRUM MOTOR
LIMITER D6~D8
41
42
H5
DRUM P HEAD
FF (1) OUT (to Y & C 81)
11
FF (2) OUT (to MECHACON 32)
52
R21 CH-1 SW PHASE
REC
P.B
D4
AMP X3, X4
21
H3
CTL HEAD
D2
D3
D1
REC 12V
REC SW
R8
PRE SET
R10
+12V
31
32
33
FIX
NORMAL
TRACKING
REC 12V
SYNC OUT (to Y & C 43)
12
VIDEO IN (from Y & C 83)
14
VIDEO AMP
SYNC SEP
MONO MULTI
IC 1 (AN301)
PAUSE 12V OUT (to Y/C 41)
16
REC LAMP
121
122
147
+12V IN
D20
REC
S1-1
P.B
144
AL 12V IN
S1-9
SQUELCH X13, D16
IC 6 (AN262)
PRE AMP
AGC
AMP
OUT
REC AMP
BIAS OSC X15, X16
OSC CTL X14
AUDIO IN (from INPUT SW 14)
113
E-E LEVEL
154
AUDIO E HEAD
P.B
REC
S2-2
151
AUDIO R/P HEAD
MIC IN
131
S1-3
D17
NF
S1-2
LPF
REC LEVEL
R128
R126
REC EQ
R144
BIAS LEVEL
116
AUDIO OUT (to CONN 1, RF 2)
S1-4
D23
S1-5
S1-6
R117
P.B. LEVEL
AUDIO P/R HEAD
159
157
D18
S1-7
0 6 AUDIO/SERVO
PAUSE 12V IN (from J.BOARD 18)
145

Key to abbreviations

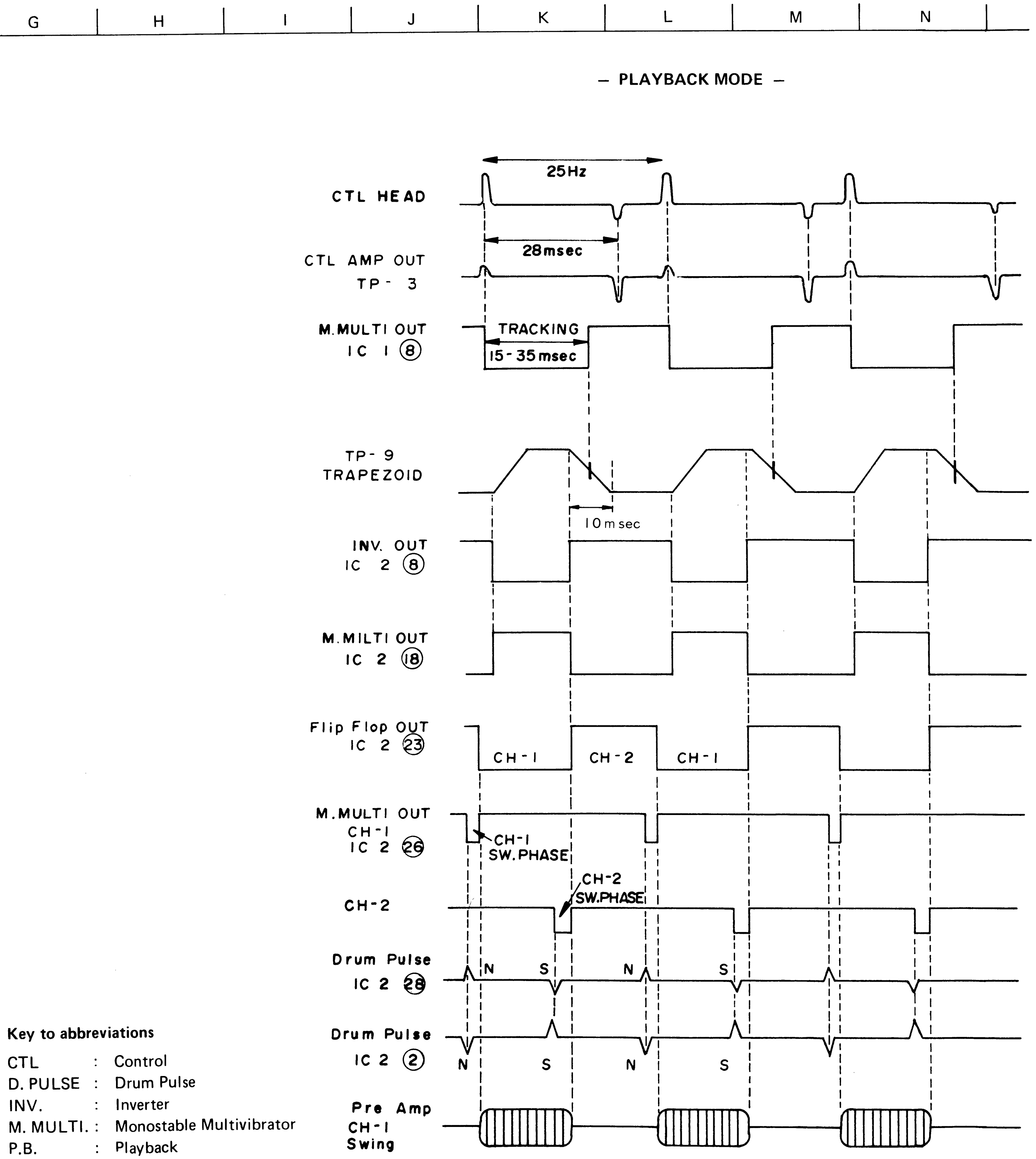
A.L. 12 V	:	After Loading 12 V DC power supply
CAP. P.U. HEAD	:	Capstan Pick-Up Head
CTL. HEAD	:	Control Head
E. HEAD	:	Erase Head
L.P.F.	:	Low-Pass Filter
M.D.A.	:	Motor Drive Amplifier
OSC.	:	Oscillator
P.B.	:	Playback
P/R HEAD	:	Playback/Record Head
P.U. HEAD	:	Pick-Up Head
S.F.	:	Source Follower
SW.	:	Electronic Switch
C. OSC	:	Ceramic Oscillator
V. SYNC. SEP.	:	Vertical Sync Separator
Y/C Board	:	Luminance and Chrominance Board

10.7 DRUM SERVO TIMING CHART

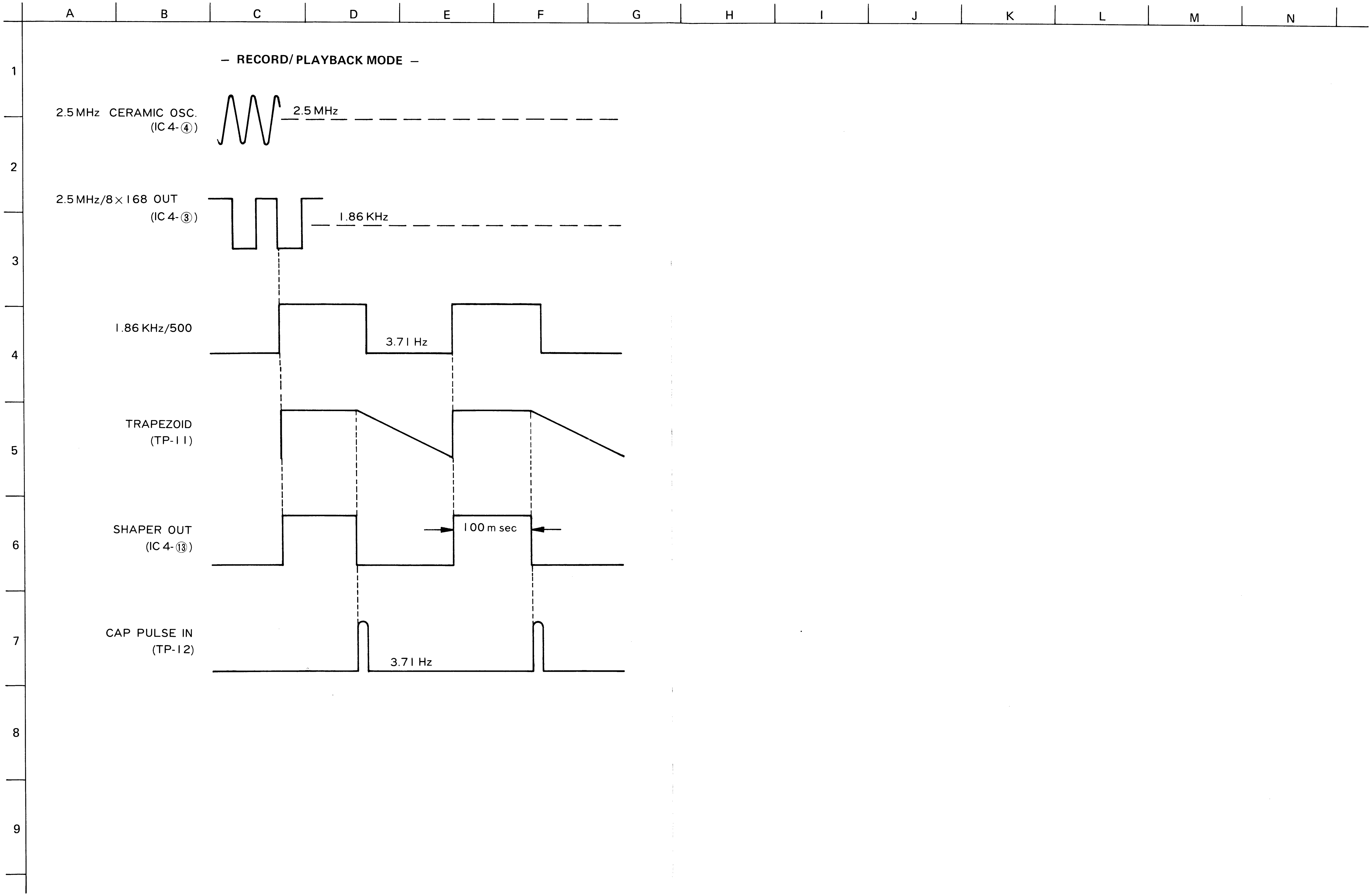

A
B
C
D
E
F
1
2
3
4
5
6
7
8
9
– RECORD MODE –
S.W. POINT
TP 2
VIDEO IN
V.SYNC. SEP. IN
IC 1 ⑫
25Hz
M. MULTI OUT
IC 1 ⑨
28 msec
10 Vp-p
CTL HAED
CTL AMP OUT
TP 3
2Vp-p
REC PHASE OUT
IC 1 ⑧
10Vp-p
TP 9
TRAPEZOID
4.5 msec
OV
DC11V
DC1V
INV. OUT
IC 2 ⑧
4Vp-p
M.MULTI OUT
IC 2 ⑱
10Vp-p
FLIP FLOP OUT
IC 2 ㉓
CH - 1
CH - 2
M.MULTI OUT
IC 2 ㉖
CH 1 SW PHASE (630~1800μsec)
(CH - 2)
CH 2 SW PHASE
D. PULSE
IC 2 ㉘
IC 2 ②
N
S
N

Key to abbreviations

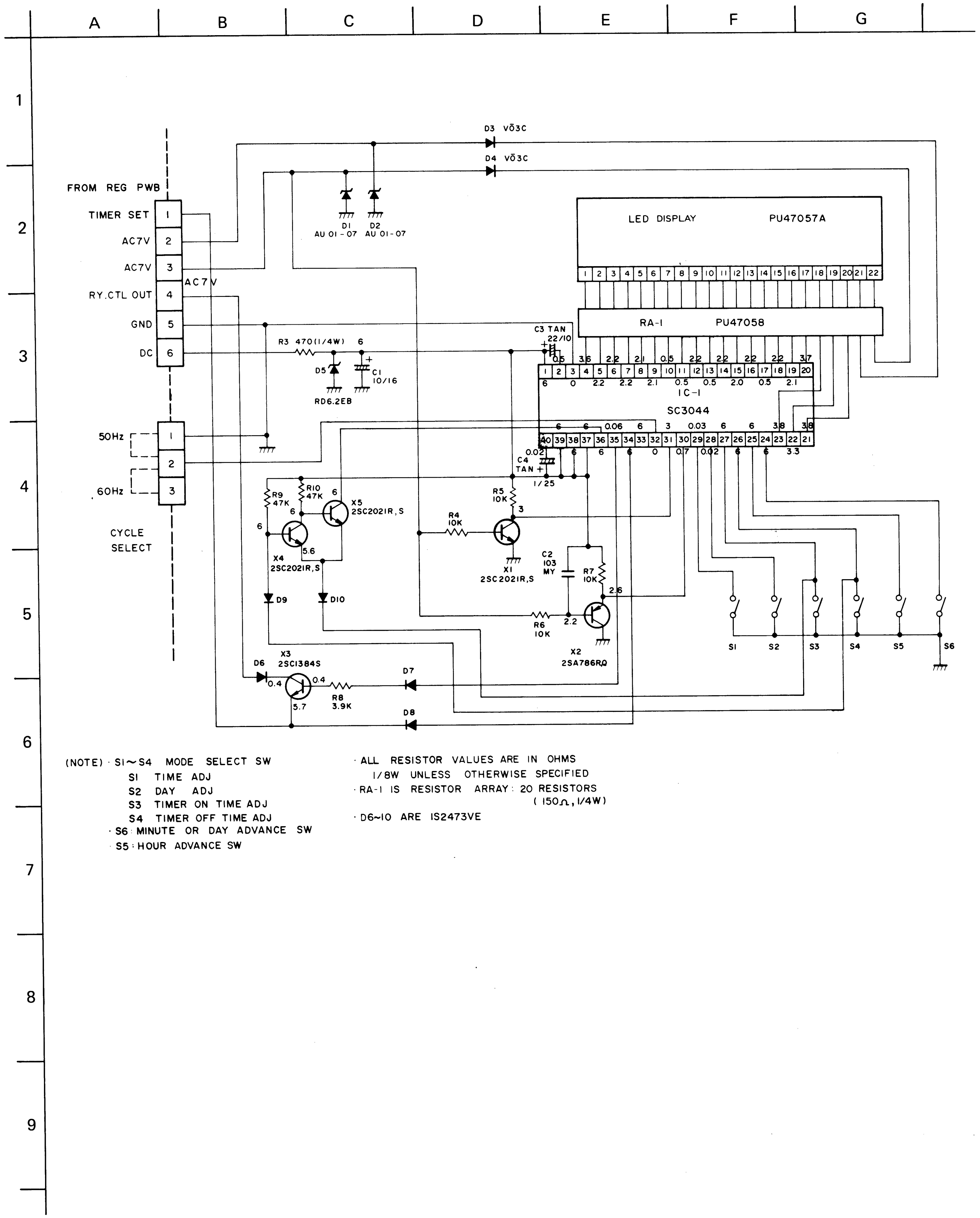
CTL	:	Control
D. PULSE	:	Drum Pulse
INV.	:	Inverter
M. MULTI.	:	Monostable Multivibrator
P.B.	:	Playback
V. SYNC SEP.	:	Vertical Sync Separator


G
H
I
J
K
L
M
N
– PLAYBACK MODE –
CTL HEAD
25Hz
CTL AMP OUT
TP - 3
28msec
M.MULTI OUT
IC 1 ⑧
TRACKING
15 - 35 msec
TP - 9
TRAPEZOID
10 msec
INV. OUT
IC 2 ⑧
M.MILTI OUT
IC 2 ⑱
Flip Flop OUT
IC 2 ㉓
CH - 1
CH - 2
CH - 1
M.MULTI OUT
CH - 1
IC 2 ㉖
CH - 1
SW. PHASE
CH - 2
CH-2
SW.PHASE
Drum Pulse
IC 2 ㉘
N
S
N
S
Drum Pulse
IC 2 ②
N
S
N
S
Pre Amp
CH - 1
Swing

10.8 CAPSTAN SERVO TIMING CHART


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
– RECORD/ PLAYBACK MODE –
2.5 MHz CERAMIC OSC. (IC 4-④)
2.5 MHz
2.5 MHz/8 × 168 OUT (IC 4-③)
1.86 KHz
1.86 KHz/500
3.71 Hz
TRAPEZOID (TP-11)
SHAPER OUT (IC 4-⑬)
100 m sec
CAP PULSE IN (TP-12)
3.71 Hz

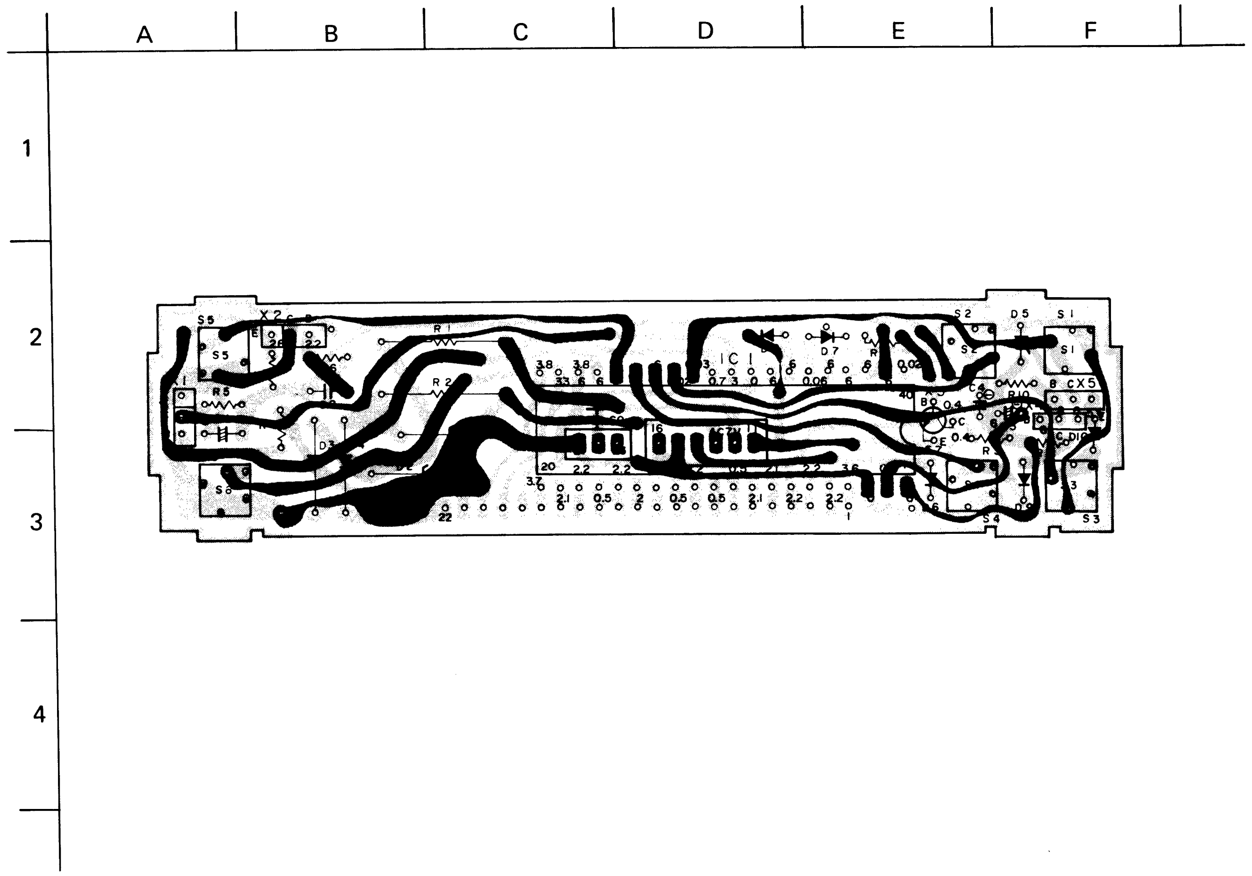
10.9 TIMER SCHEMATIC DIAGRAM


A
B
C
D
E
F
G
1
2
3
4
5
6
7
8
9
FROM REG PWB
TIMER SET 1
AC7V 2
AC7V 3
RY.CTL OUT 4
GND 5
DC 6
AC7V
D3 VŌ3C
D4 VŌ3C
D1 AU 01 - 07
D2 AU 01 - 07
R3 470(1/4W)
D5
RD6.2EB
C1 10/16
C3 TAN 22/10
LED DISPLAY
PU47057A
RA-1
PU47058
IC-1
SC3044
C4 TAN 1/25
0.02
50Hz
60Hz
CYCLE SELECT
R9 47K
R10 47K
X4 2SC2021R,S
X5 2SC2021R,S
D9
D10
R4 10K
R5 10K
X1 2SC2021R,S
C2 103 MY
R7 10K
R6 10K
X2 2SA786RQ
D6
X3 2SC1384S
R8 3.9K
D7
D8
S1
S2
S3
S4
S5
S6

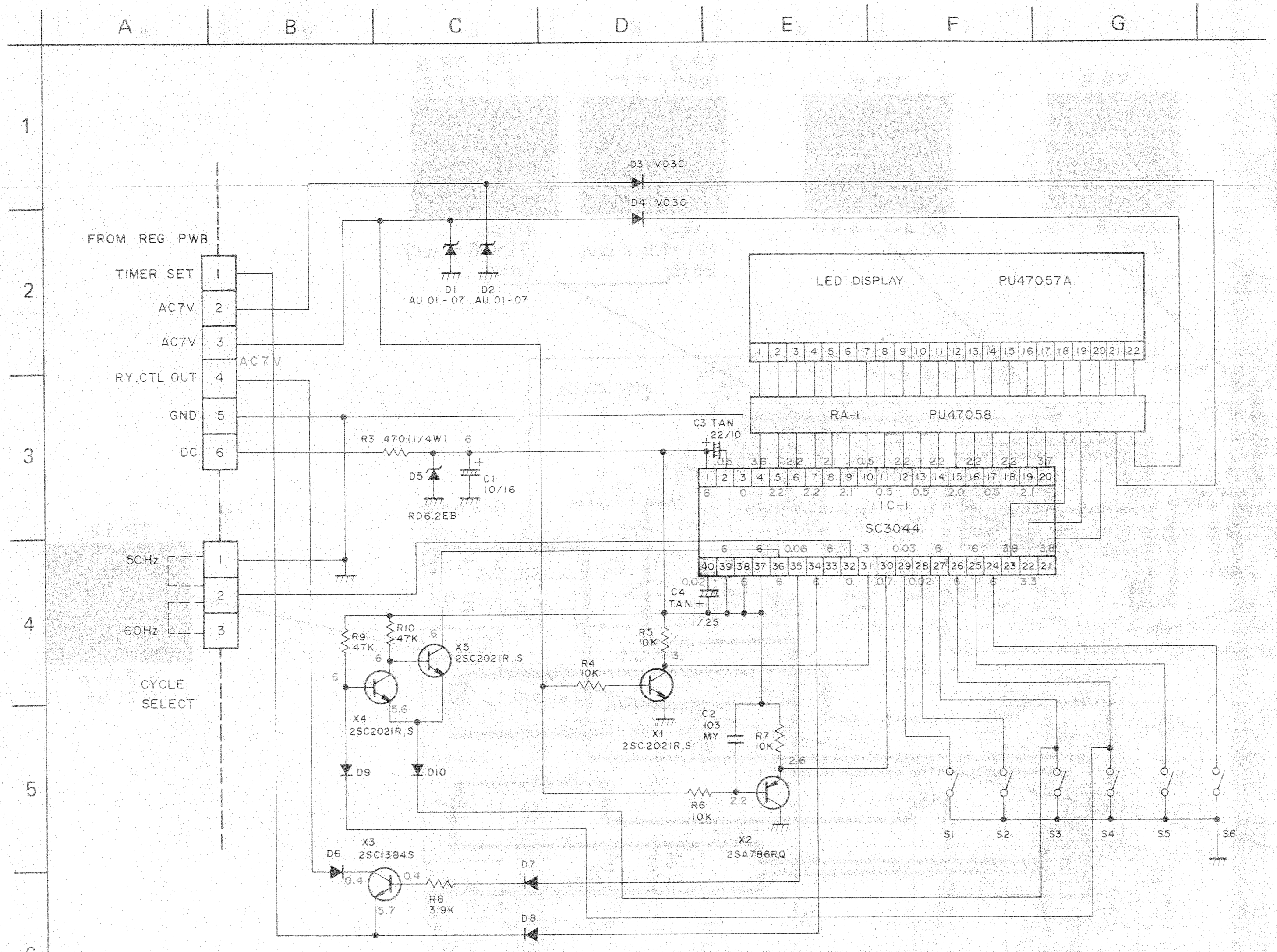
(NOTE) · S1~S4 MODE SELECT SW
S1 TIME ADJ
S2 DAY ADJ
S3 TIMER ON TIME ADJ
S4 TIMER OFF TIME ADJ
· S6 : MINUTE OR DAY ADVANCE SW
· S5 : HOUR ADVANCE SW

· ALL RESISTOR VALUES ARE IN OHMS 1/8W UNLESS OTHERWISE SPECIFIED
· RA-1 IS RESISTOR ARRAY : 20 RESISTORS (150Ω, 1/4W)
· D6~10 ARE IS2473VE

10.10 TIMER CIRCUT BOARD


A
B
C
D
E
F
1
2
3
4
S5
X2
S6
R5
R1
R2
D3
IC1
D7
D5
S2
S1
C4
R10
X5
D10
S4
S3
20
22
40
16
1

10.9 TIMER SCHEMATIC DIAGRAM

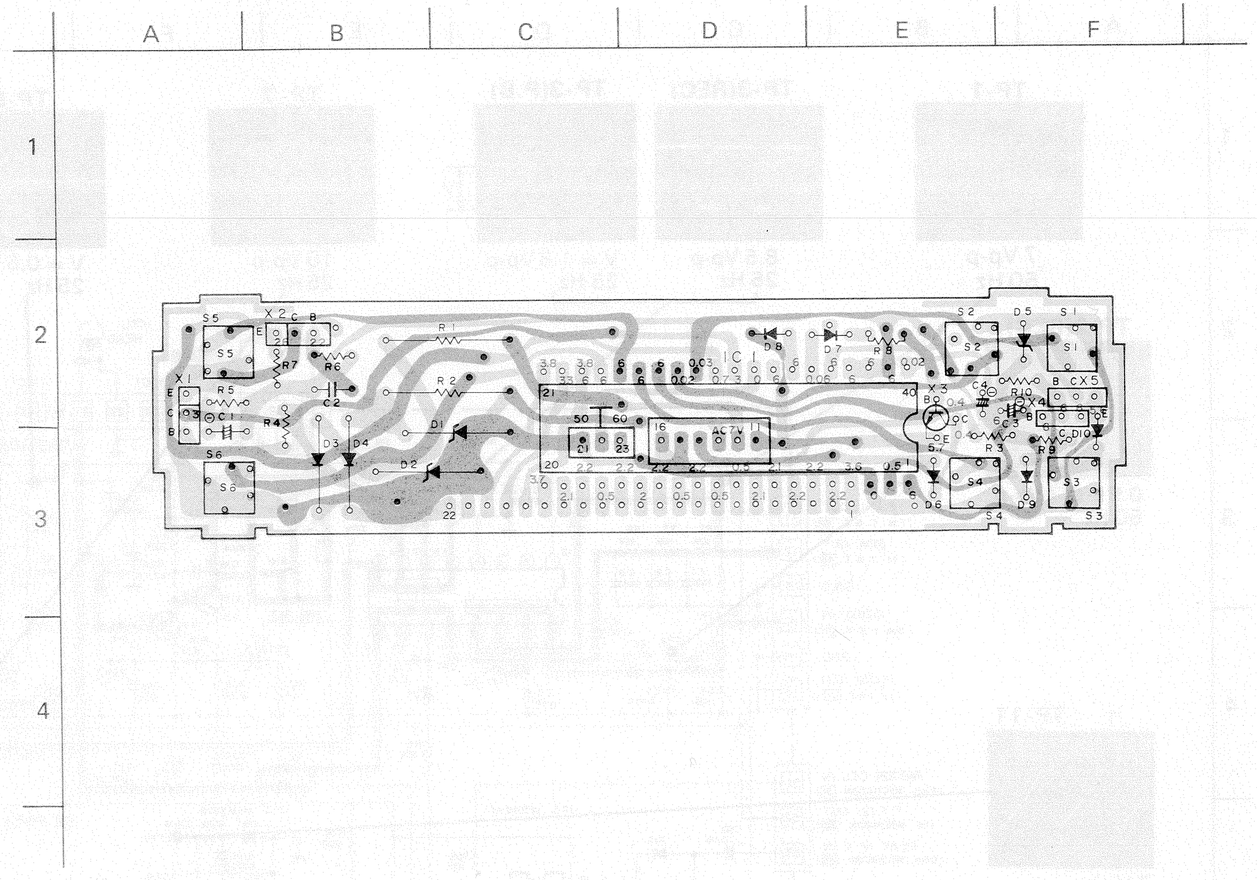

A
B
C
D
E
F
G
1
2
3
4
5
FROM REG PWB
TIMER SET
AC7V
AC7V
RY.CTL OUT
GND
DC
AC7V
50Hz
60Hz
CYCLE
SELECT
D3 VŌ3C
D4 VŌ3C
D1
AU 01-07
D2
AU 01-07
R3 470(1/4W)
D5
RD6.2EB
C1
10/16
C3 TAN
22/10
LED DISPLAY
PU47057A
RA-1
PU47058
IC-1
SC3044
C4
TAN
1/25
R9
47K
R10
47K
X5
2SC2021R,S
X4
2SC2021R,S
R5
10K
R4
10K
X1
2SC2021R,S
C2
103
MY
R7
10K
R6
10K
X2
2SA786RQ
D9
D10
D6
X3
2SC1384S
R8
3.9K
D7
D8
S1
S2
S3
S4
S5
S6

(NOTE) · S1～S4 MODE SELECT SW
S1 TIME ADJ
S2 DAY ADJ
S3 TIMER ON TIME ADJ
S4 TIMER OFF TIME ADJ
· S6 MINUTE OR DAY ADVANCE SW
S5 · HOUR ADVANCE SW

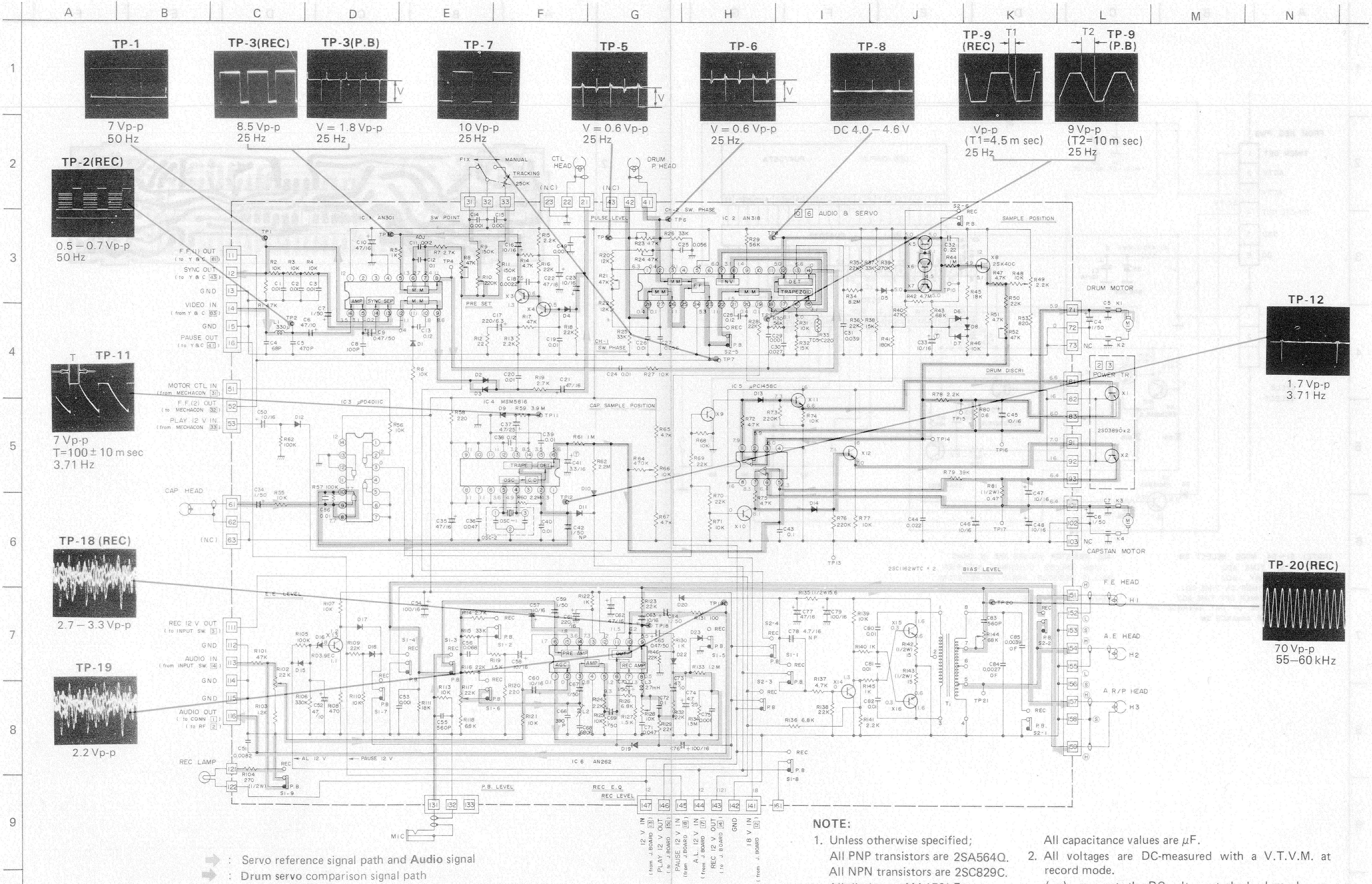
· ALL RESISTOR VALUES ARE IN OHMS
1/8W UNLESS OTHERWISE SPECIFIED
· RA-1 IS RESISTOR ARRAY: 20 RESISTORS
(150Ω, 1/4W)

· D6～10 ARE 1S2473VE

10.10 TIMER CIRCUIT BOARD


A
B
C
D
E
F
1
2
3
4
S5
X2
C
B
E
R7
R6
X1
R5
C1
R4
C2
R1
R2
D1
D2
D3
D4
S6
IC1
21
40
20
1
50
60
16
AC7V
23
22
D8
D7
R8
S2
D5
S1
X3
C4
R10
X4
C3
CX5
R3
R9
D10
D6
S4
D9
S3

10.11 AUDIO AND SERVO (A/S) CIRCUIT SCHEMATIC DIAGRAM


A B C D E F G H I J K L M N
1 2 3 4 5 6 7 8 9
TP-1
7 Vp-p
50 Hz
TP-3(REC)
8.5 Vp-p
25 Hz
TP-3(P.B)
V = 1.8 Vp-p
25 Hz
TP-7
10 Vp-p
25 Hz
TP-5
V = 0.6 Vp-p
25 Hz
TP-6
V = 0.6 Vp-p
25 Hz
TP-8
DC 4.0 – 4.6 V
TP-9 (REC)
Vp-p
(T1=4.5 m sec)
25 Hz
TP-9 (P.B)
9 Vp-p
(T2=10 m sec)
25 Hz
TP-2(REC)
0.5 – 0.7 Vp-p
50 Hz
TP-11
7 Vp-p
T=100 ± 10 m sec
3.71 Hz
TP-12
1.7 Vp-p
3.71 Hz
TP-18 (REC)
2.7 – 3.3 Vp-p
TP-19
2.2 Vp-p
TP-20(REC)
70 Vp-p
55–60 kHz
IC 1 AN301
IC 2 AN318
IC 3 μPD4011C
IC 4 MSM5816
IC 5 μPC1458C
IC 6 AN262
D6 AUDIO & SERVO
CTL HEAD
DRUM P. HEAD
DRUM MOTOR
CAPSTAN MOTOR
CAP. HEAD
POWER TR.
F.E. HEAD
A.E. HEAD
A.R/P HEAD
REC LAMP
MIC
SW. POINT
PULSE LEVEL
CH-2 SW. PHASE
CH-1 SW. PHASE
SAMPLE POSITION
CAP. SAMPLE POSITION
DRUM DISCRI.
BIAS LEVEL
E.E. LEVEL
P.B. LEVEL
REC. E.Q.
REC. LEVEL
TRACKING
F.F.(1) OUT
SYNC OUT
GND
VIDEO IN
PAUSE OUT
MOTOR CTL IN
F.F.(2) OUT
PLAY 12 V IN
REC 12 V OUT
AUDIO IN
AUDIO OUT
12 V IN
PLAY 12 V OUT
PAUSE 12 V IN
A.L. 12 V IN
REC 12 V OUT
18 V IN

➡ : Servo reference signal path and **Audio** signal

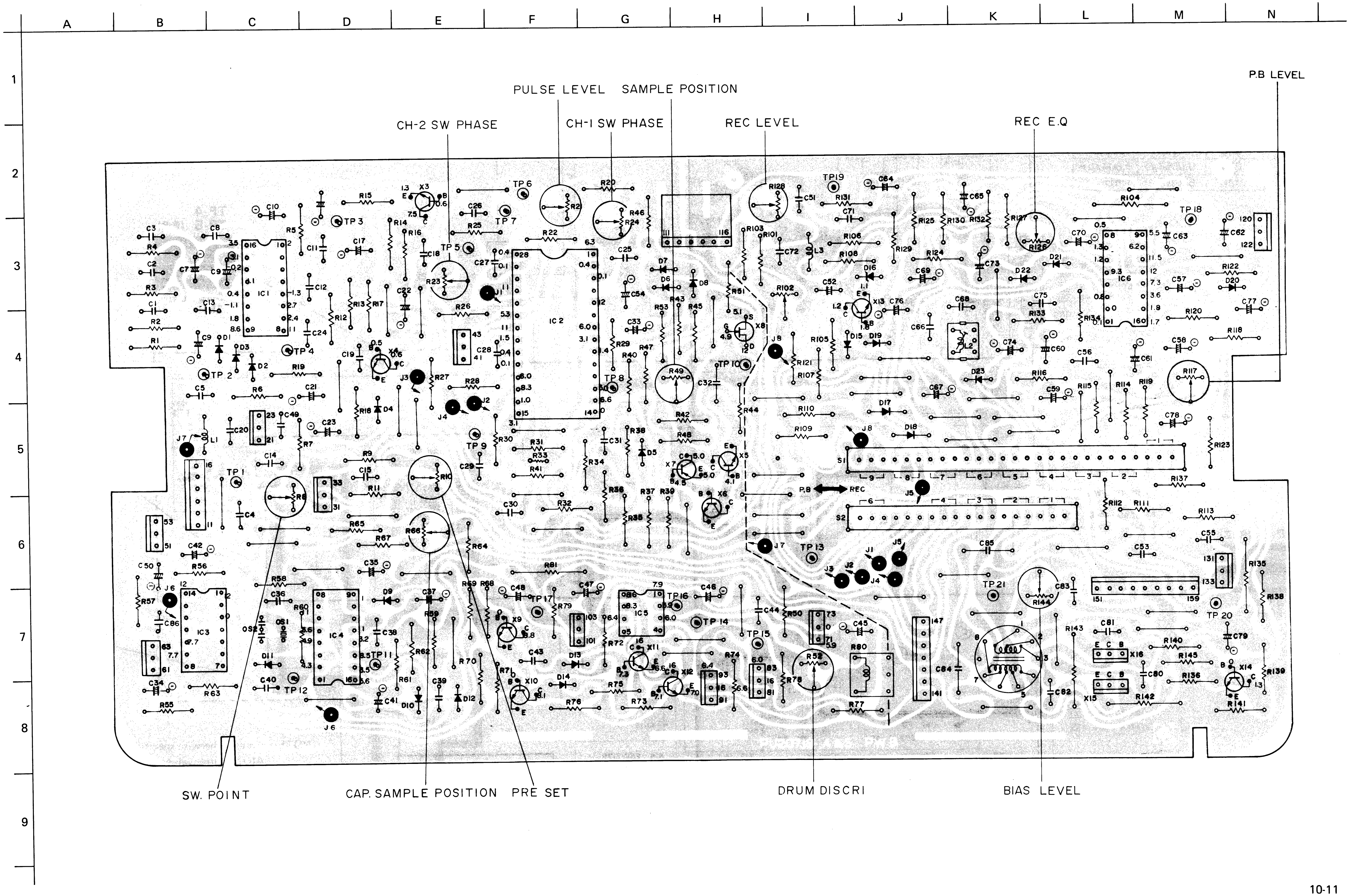
➡ : **Drum servo** comparison signal path

➡ : Capstan servo comparison signal path

NOTE:

1. Unless otherwise specified;
   All PNP transistors are 2SA564Q.
   All NPN transistors are 2SC829C.
   All diodes are MA150LF.
   All resistance values are in ohms, ¼ W, ±10%.
   All capacitance values are μF.
2. All voltages are DC-measured with a V.T.V.M. at record mode.
   ( ) represents the DC voltage at playback mode.

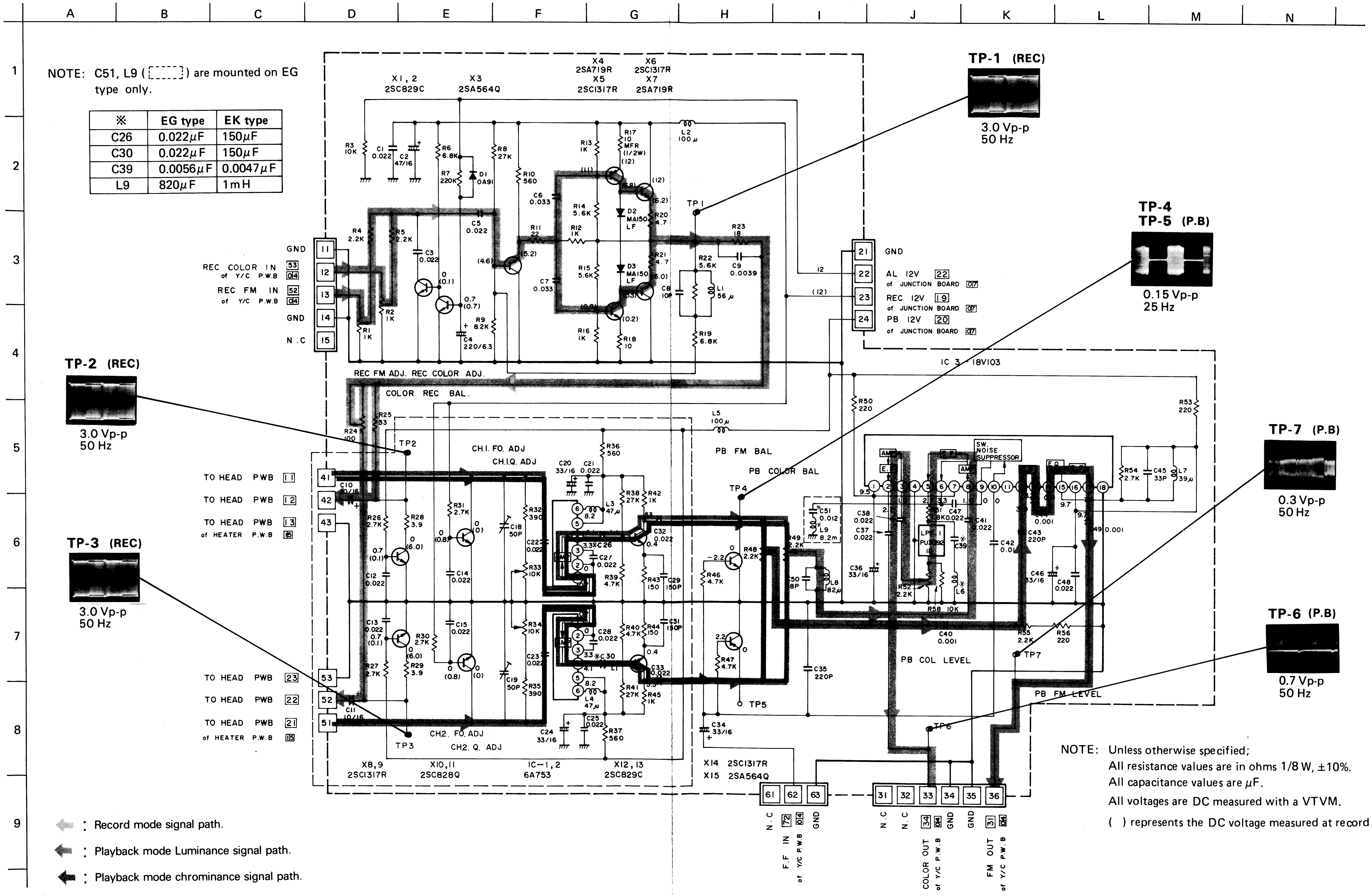
10.12 AUDIO AND SERVO (A/S) CIRCUIT BOARD


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
PULSE LEVEL
SAMPLE POSITION
CH-2 SW PHASE
CH-1 SW PHASE
REC LEVEL
REC E.Q
P.B LEVEL
SW. POINT
CAP. SAMPLE POSITION
PRE SET
DRUM DISCRI
BIAS LEVEL
P.B
REC
S1
S2
IC1
IC2
IC3
IC4
IC5
IC6

10.13 PRE AND RECORD (PRE/REC) CIRCUIT SCHEMATIC DIAGRAM

NOTE: C51, L9 ( ) are mounted on EG type only.

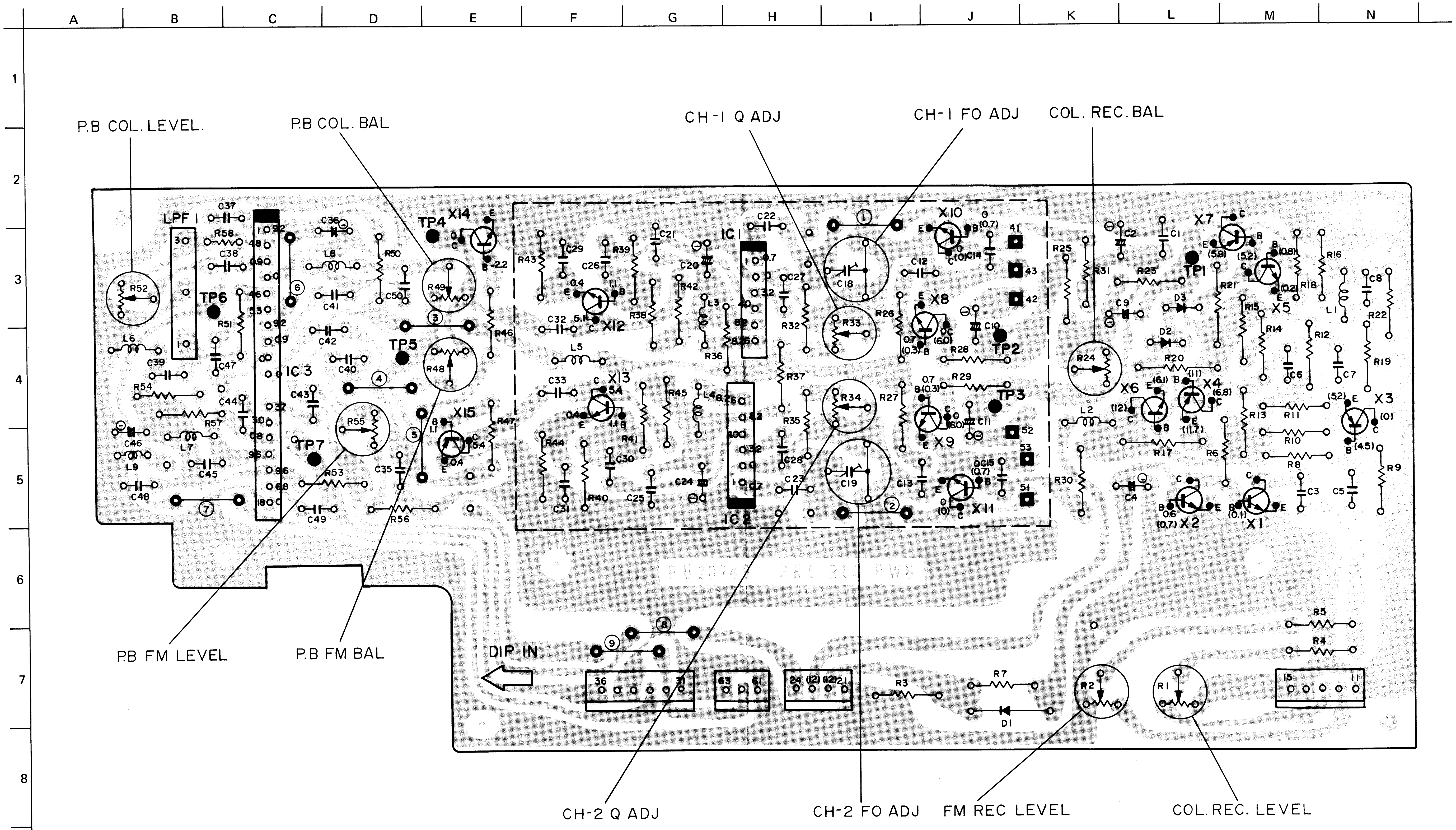
※	EG type	EK type
C26	0.022μF	150μF
C30	0.022μF	150μF
C39	0.0056μF	0.0047μF
L9	820μF	1mH


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
X1, 2 2SC829C
X3 2SA564Q
X4 2SA719R
X5 2SC1317R
X6 2SC1317R
X7 2SA719R
TP-1 (REC)
3.0 Vp-p
50 Hz
TP-4
TP-5 (P.B)
0.15 Vp-p
25 Hz
TP-2 (REC)
3.0 Vp-p
50 Hz
TP-3 (REC)
3.0 Vp-p
50 Hz
TP-7 (P.B)
0.3 Vp-p
50 Hz
TP-6 (P.B)
0.7 Vp-p
50 Hz
GND
REC COLOR IN 53 of Y/C P.W.B 04
REC FM IN 52 of Y/C P.W.B 04
GND
N.C
11
12
13
14
15
GND
AL 12V 22 of JUNCTION BOARD 07
REC 12V 19 of JUNCTION BOARD 07
PB 12V 20 of JUNCTION BOARD 07
21
22
23
24
TP1
TP2
TP3
TP4
TP5
TP6
TP7
REC FM ADJ.
REC COLOR ADJ.
COLOR REC BAL.
PB FM BAL
PB COLOR BAL
CH.I. FO. ADJ
CH.I.Q. ADJ
CH2. FO. ADJ
CH2. Q. ADJ
PB COL LEVEL
PB FM LEVEL
IC 3 18V103
SW. NOISE SUPPRESSOR
TO HEAD PWB 11
TO HEAD PWB 12
TO HEAD PWB 13 of HEATER P.W.B 16
TO HEAD PWB 23
TO HEAD PWB 22
TO HEAD PWB 21 of HEATER P.W.B 15
41
42
43
53
52
51
X8,9 2SC1317R
X10,11 2SC828Q
IC-1,2 6A753
X12,13 2SC829C
X14 2SC1317R
X15 2SA564Q
61
62
63
31
32
33
34
35
36
N.C
F.F IN 72 of Y/C P.W.B 04
GND
N.C
N.C
COLOR OUT 34 of Y/C P.W.B 04
GND
FM OUT 31 of Y/C P.W.B 04
R3 10K
C1 0.022
C2 47/16
R6 6.8K
R7 220K
D1 OA91
R8 27K
R10 560
C6 0.033
R13 1K
R17 10 MFR (1/2W)
L2 100μ
R14 5.6K
D2 MA150 LF
R20 4.7
R4 2.2K
R5 2.2K
C5 0.022
R11 22
R12 1K
R23 18
C3 0.022
R21 4.7
R22 5.6K
C9 0.0039
R15 5.6K
C7 0.033
D3 MA150 LF
C8 10P
L1 56μ
R2 1K
R1 1K
R9 8.2K
C4 220/6.3
R16 1K
R18 10
R19 6.8K
R25 33
R24 100
R36 560
C20 33/16
C21 0.022
L5 100μ
R50 220
R53 220
C10 10/16
R26 2.7K
R28 3.9
R31 2.7K
R32 390
C18 50P
L3 47μ
R38 27K
R42 1K
C51 0.012
L9 8.2m
C38 0.022
C37 0.022
C47 0.022
C41 0.022
C39
R54 2.7K
C45 33P
L7 39μ
C26
C27 0.022
C32 0.022
R48 2.2K
R49 2.2K
C22 0.022
C12 0.022
C14 0.022
R33 10K
R39 4.7K
R43 150
C29 150P
R46 4.7K
C50 18P
L8 82μ
C36 33/16
R52 2.2K
L6
C42 0.01
C43 220P
C46 33/16
C48 0.022
C13 0.022
R30 2.7K
C15 0.022
R34 10K
C28 0.022
R40 4.7K
R44 150
C31 150P
R58 10K
C40 0.001
R55 2.2K
R56 220
R27 2.7K
R29 3.9
C19 50P
R35 390
C23 0.022
C30
C33 0.022
R47 4.7K
C35 220P
C11 10/16
L4 47μ
R41 27K
R45 1K
C24 33/16
C25 0.022
R37 560
C34 33/16
LPF-1 PU3092

- ⇐ : Record mode signal path.
- ⇐ : Playback mode Luminance signal path.
- ⇐ : Playback mode chrominance signal path.

NOTE: Unless otherwise specified;
All resistance values are in ohms 1/8 W, ±10%.
All capacitance values are μF.
All voltages are DC measured with a VTVM.
( ) represents the DC voltage measured at record mode.

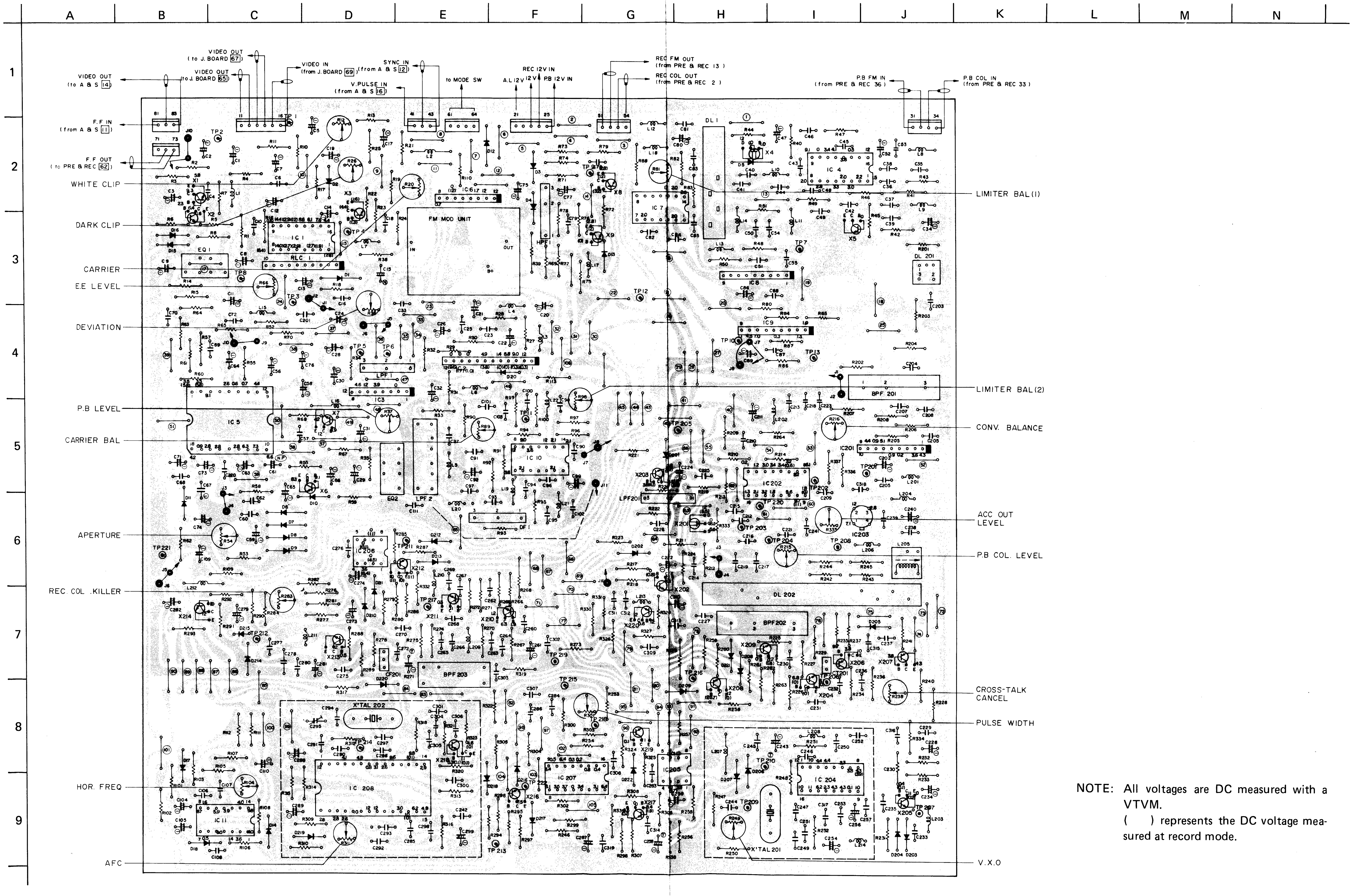
10.14 PRE AND RECORD (PRE/REC) CIRCUIT BOARD


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
P.B COL. LEVEL.
P.B COL. BAL
CH-1 Q ADJ
CH-1 FO ADJ
COL. REC. BAL
P.B FM LEVEL
P.B FM BAL
DIP IN
CH-2 Q ADJ
CH-2 FO ADJ
FM REC LEVEL
COL. REC. LEVEL
LPF 1
IC 1
IC 2
IC 3
TP1
TP2
TP3
TP4
TP5
TP6
TP7
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
X12
X13
X14
X15
R52
R49
R48
R55
R33
R34
R24
R2
R1
PU20749 PRE.REC PWB

NOTE: All voltages are DC measured with a VTVM.

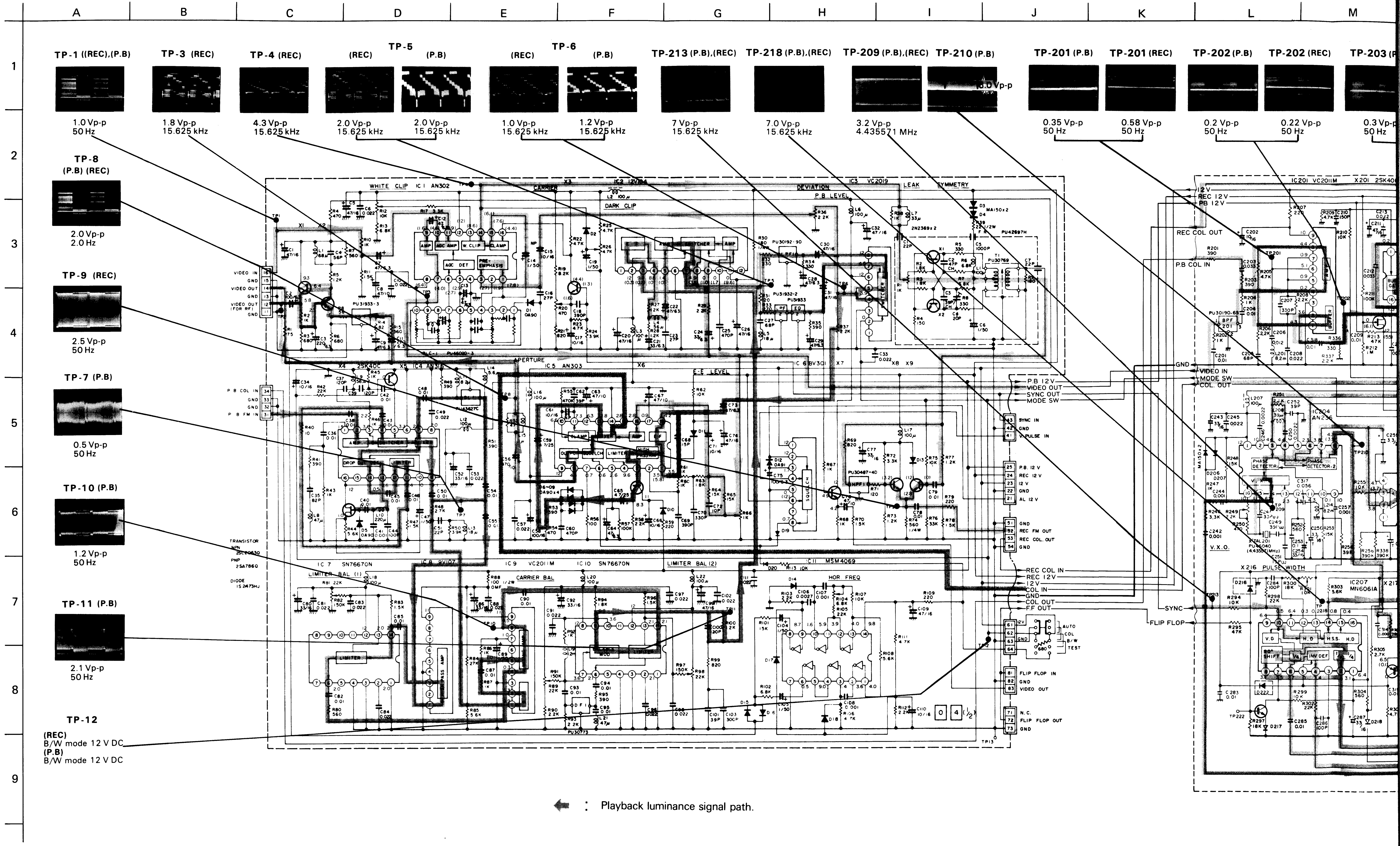
( ) represents the DC voltage measured at record mode.

10.15 LUMINANCE AND CHROMINACE (Y/C) CIRCUIT BOARD

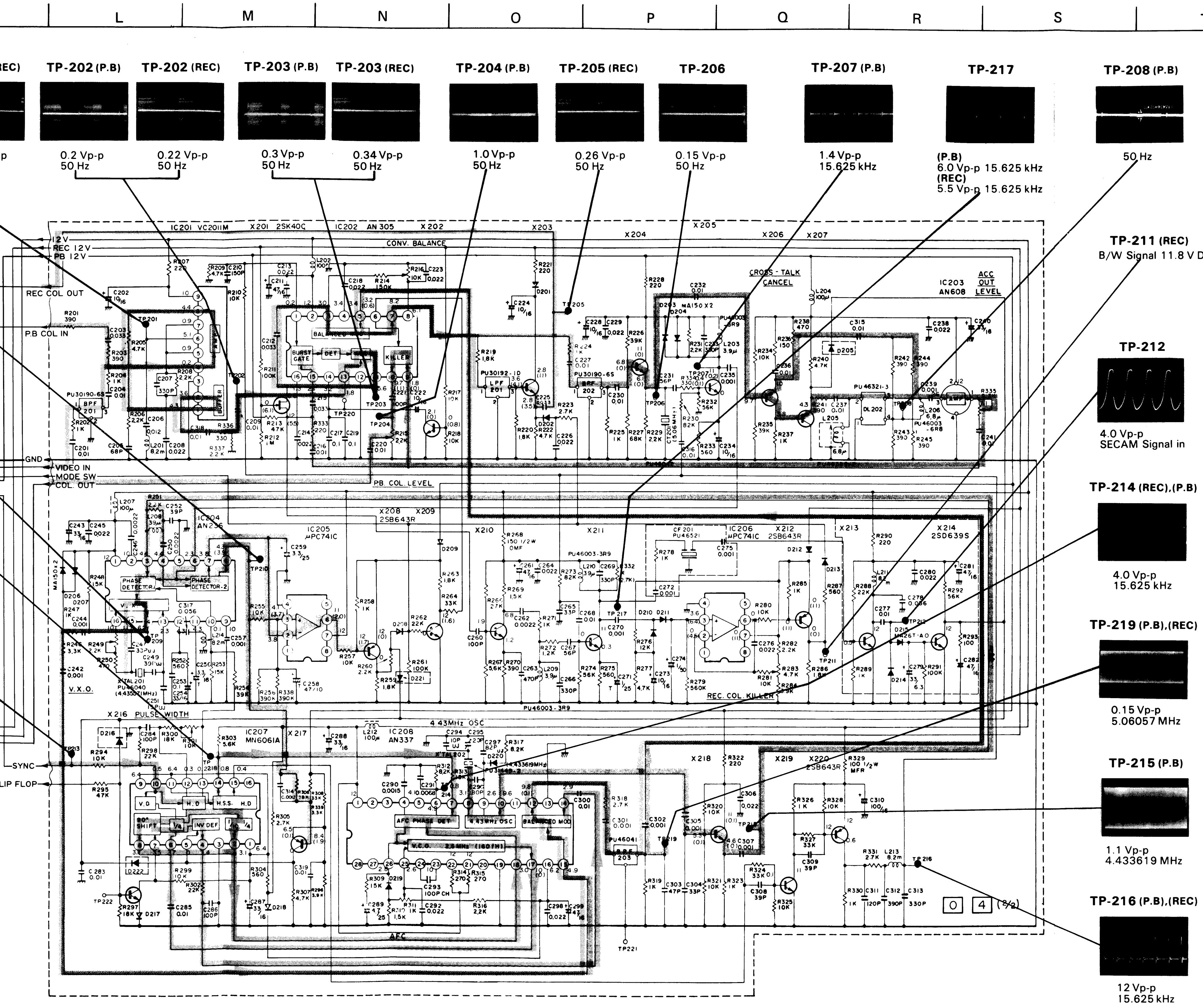

A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
VIDEO OUT (to A & S 14)
VIDEO OUT (to J. BOARD 67)
VIDEO OUT (to J. BOARD 65)
VIDEO IN (from J. BOARD 69)
SYNC IN (from A & S 12)
V.PULSE IN (from A & S 16)
to MODE SW
REC 12V IN
A.L.12V
12V
PB 12V IN
REC FM OUT (from PRE & REC 13)
REC COL OUT (from PRE & REC 2)
P.B FM IN (from PRE & REC 36)
P.B COL IN (from PRE & REC 33)
F.F IN (from A & S 11)
F.F OUT (to PRE & REC 62)
WHITE CLIP
DARK CLIP
CARRIER
EE LEVEL
DEVIATION
P.B LEVEL
CARRIER BAL
APERTURE
REC COL. KILLER
HOR. FREQ
AFC
LIMITER BAL (1)
LIMITER BAL (2)
CONV. BALANCE
ACC OUT LEVEL
P.B COL. LEVEL
CROSS-TALK CANCEL
PULSE WIDTH
V.X.O
FM MOD UNIT
IC 1
IC 3
IC 4
IC 5
IC 7
IC 8
IC 9
IC 10
IC 11
IC 201
IC 202
IC 203
IC 204
IC 205
IC 206
IC 207
IC 208
DL 1
DL 201
DL 202
BPF 201
BPF 202
BPF 203
LPF 1
LPF 2
LPF 201
EQ 1
EQ 2
RLC 1
HPF 1
DF 1
X'TAL 201
X'TAL 202

NOTE: All voltages are DC measured with a VTVM.
( ) represents the DC voltage measured at record mode.

10.16 LUMINANCE AND CHROMINANCE (Y/C) CIRCUIT SCHEMATIC DIAGRAM


A
B
C
D
E
F
G
H
I
J
K
L
M
1
2
3
4
5
6
7
8
9
TP-1 ((REC),(P.B)
1.0 Vp-p
50 Hz
TP-3 (REC)
1.8 Vp-p
15.625 kHz
TP-4 (REC)
4.3 Vp-p
15.625 kHz
TP-5
(REC)
2.0 Vp-p
15.625 kHz
(P.B)
2.0 Vp-p
15.625 kHz
TP-6
(REC)
1.0 Vp-p
15.625 kHz
(P.B)
1.2 Vp-p
15.625 kHz
TP-213 (P.B),(REC)
7 Vp-p
15.625 kHz
TP-218 (P.B),(REC)
7.0 Vp-p
15.625 kHz
TP-209 (P.B),(REC)
3.2 Vp-p
4.435571 MHz
TP-210 (P.B)
3.0 Vp-p
TP-201 (P.B)
0.35 Vp-p
50 Hz
TP-201 (REC)
0.58 Vp-p
50 Hz
TP-202 (P.B)
0.2 Vp-p
50 Hz
TP-202 (REC)
0.22 Vp-p
50 Hz
TP-203 (
0.3 Vp-
50 Hz
TP-8
(P.B) (REC)
2.0 Vp-p
2.0 Hz
TP-9 (REC)
2.5 Vp-p
50 Hz
TP-7 (P.B)
0.5 Vp-p
50 Hz
TP-10 (P.B)
1.2 Vp-p
50 Hz
TP-11 (P.B)
2.1 Vp-p
50 Hz
TP-12
(REC)
B/W mode 12 V DC
(P.B)
B/W mode 12 V DC
WHITE CLIP IC1 AN302
CARRIER X3
IC2 12V
DARK CLIP
DEVIATION
IC3 VC2019
P.B LEVEL
LEAK
SYMMETRY
AGC AMP
W. CLIP
CLAMP
AGC DET
PRE-EMPHASIS
PU31933-3
PU46020-3
PU30192-9D
PU31932-2
PU31933
PU42697H
PU30769
VIDEO IN
GND
VIDEO OUT
VIDEO OUT (FOR RF)
P.B COL IN
P.B FM IN
X4 2SK40C
X5 IC4 AN316
APERTURE
IC5 AN303
X6
E-E LEVEL
IC6 BV301
X7
X8
X9
DROP OUT
LIMITER
CLAMP
SQUELCH
HIGH PASS
PU30487-4D
P.B 12V
VIDEO OUT
SYNC OUT
MODE SW
SYNC IN
V. PULSE IN
REC 12 V
12 V
AL 12 V
REC FM OUT
REC COL. OUT
TRANSISTOR
NPN 2SC2063Q
PNP 2SA786Q
DIODE 1S2473HJ
IC7 SN76670N
IC8 9V107
IC9 VC2011M
IC10 SN76670N
LIMITER BAL (1)
CARRIER BAL
LIMITER BAL (2)
IC11 MSM4069
HOR FREQ
REC COL IN
REC 12V
COL IN
GND
COL OUT
F.F OUT
AUTO
COL
B/W
TEST
FLIP FLOP IN
VIDEO OUT
N.C.
FLIP FLOP OUT
PU30773
TP13
IC201 VC2011M
X201 2SK40
REC COL OUT
P.B COL IN
PU30190-6B
BPF
BUFFER
GND
VIDEO IN
MODE SW
COL. OUT
IC204 AN2
PHASE DETECTOR-1
PHASE DETECTOR-2
V.X.O.
X216 PULSE WIDTH
IC207 MN6061A
SYNC
FLIP FLOP
V.D
H.D
H.SS.
90° SHIFT
INV DEF
TP222

⬅ : Playback luminance signal path.


L
M
N
O
P
Q
R
S
T
U
V
W
X
TP-202 (P.B)
0.2 Vp-p 50 Hz
TP-202 (REC)
0.22 Vp-p 50 Hz
TP-203 (P.B)
0.3 Vp-p 50 Hz
TP-203 (REC)
0.34 Vp-p 50 Hz
TP-204 (P.B)
1.0 Vp-p 50 Hz
TP-205 (REC)
0.26 Vp-p 50 Hz
TP-206
0.15 Vp-p 50 Hz
TP-207 (P.B)
1.4 Vp-p 15.625 kHz
TP-217
(P.B) 6.0 Vp-p 15.625 kHz
(REC) 5.5 Vp-p 15.625 kHz
TP-208 (P.B)
50 Hz
TP-211 (REC)
B/W Signal 11.8 V DC
TP-212
4.0 Vp-p SECAM Signal in
TP-214 (REC),(P.B)
4.0 Vp-p 15.625 kHz
TP-219 (P.B),(REC)
0.15 Vp-p 5.06057 MHz
TP-215 (P.B)
1.1 Vp-p 4.433619 MHz
TP-216 (P.B),(REC)
12 Vp-p 15.625 kHz
IC201 VC2011M
X201 2SK40C
IC202 AN305
X202
X203
X204
X205
X206
X207
12 V
REC 12 V
PB 12 V
REC COL OUT
PB COL IN
GND
VIDEO IN
MODE SW
COL. OUT
SYNC
FLIP FLOP
CONV. BALANCE
CROSS-TALK CANCEL
IC203 AN608
ACC OUT LEVEL
BURST GATE
DET
KILLER
BUFFER
BPF
LPF
PU30190-65
PU30192-10
PU46321-3
DL202
PU46003-6R8
PB. COL. LEVEL
IC204 AN236
PHASE DETECTOR
PHASE DETECTOR-2
IC205 μPC741C
X208 X209 2SB643R
X210
X211
IC206 μPC741C
X212 2SB643R
X213
X214 2SD639S
CF201 PU46521
PU46003-3R9
REC. COL. KILLER
V.X.O.
XTAL201 PU46040 (4.43361MHz)
X216 PULSE WIDTH
IC207 MN6061A
X217
IC208 AN337
4.43MHz OSC
XTAL202
AFC PHASE DET
4.43MHz OSC
BALANCED MOD
V.C.O. 2.5MHz (160fH)
AFC
X218
X219
X220 2SB643R
PU46041
V.D
H.D
H.S.S.
90° SHIFT
INV DEF
TP221
TP222
0 4 (8/9)

▨ : AFC signal path.

All reference numbers of components in colour circuit diagram are started from 201.

All voltages are DC measured with a VTVM.

( ) represents the DC voltage measured at record mode.

X213, 214, D205, 214–216, 221, 222, CF201, C272, 275, 277–283, R278, 288–293, L211, and TP-212 (⁝) are mounted on HR-3330EG only.

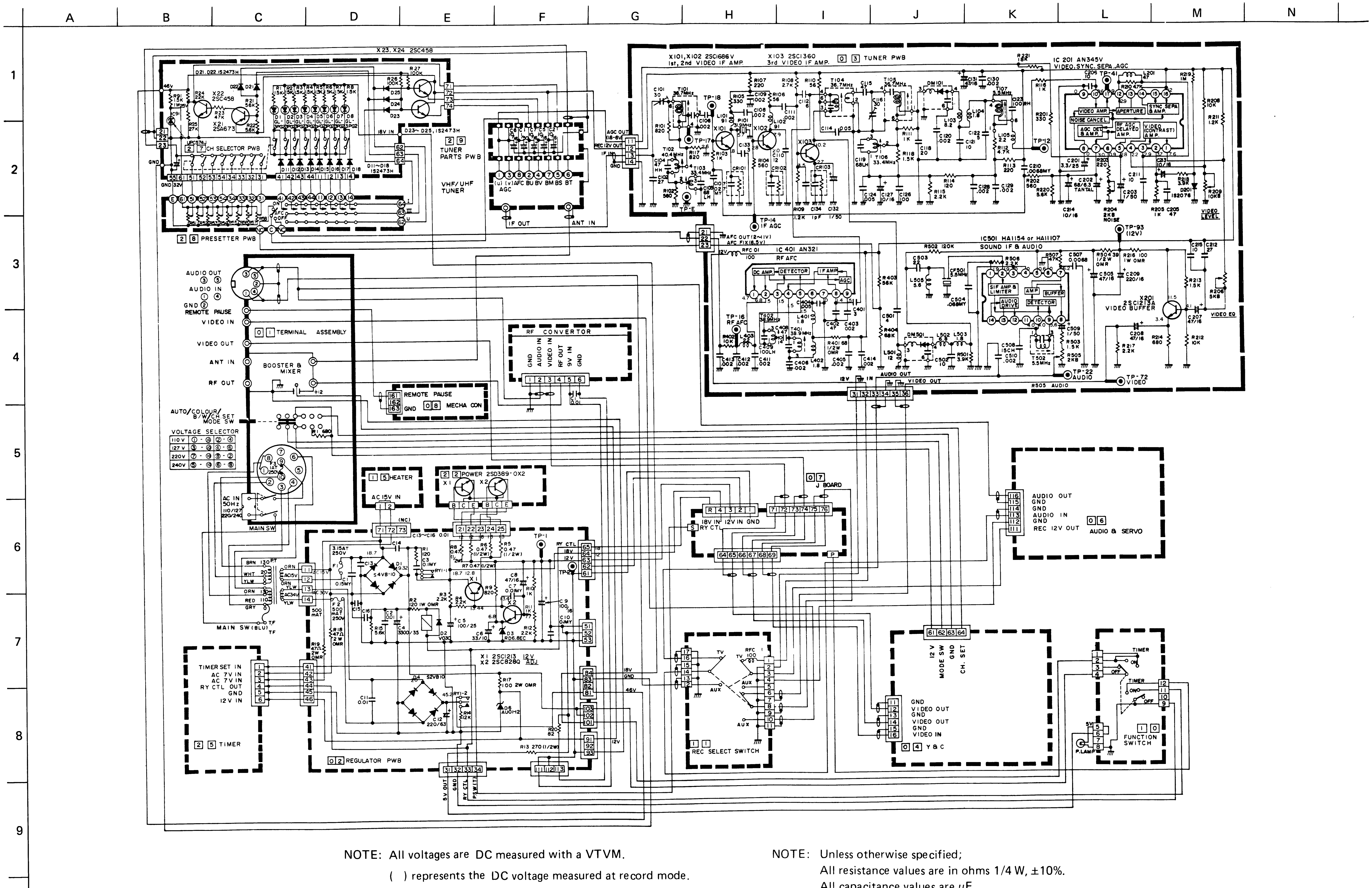
R332 is mounted on EK type only.

NOTE: Unless otherwise specified;
All PNP transistors are 2SA564Q.
All NPN transistors are 2SC829C.
All diodes are MA150LF
All resistance values are in ohms, 1/4 W, ±10%.
OMF : Oxide metal film resistor
$\pm$: Electrolytic capacitor
: Non-polar electrolytic capacitor
: Mylar or ceramic capacitor

▨ : Playback mode chrominance signal path and APC signal path.

▨ : Record mode signal path.

10.17 TUNER SCHEMATIC DIAGRAM (HR-3330EG)



A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
X23, X24 2SC458
2 7 CH SELECTOR PWB
2 8 PRESETTER PWB
2 9 TUNER PARTS PWB
VHF/UHF TUNER
IF OUT
ANT IN
X101, X102 2SC1686V 1st, 2nd VIDEO IF AMP
X103 2SC1360 3rd VIDEO IF AMP.
0 3 TUNER PWB
IC 201 AN345V VIDEO, SYNC. SEPA. AGC
VIDEO AMP
APERTURE
SYNC SEPA & AMP.
NOISE CANCEL
AGC DET & AMP.
RF AGC DELAYED AMP.
VIDEO (CONTRAST) AMP.
VIDEO LEVEL
NOISE
TP-93 (12V)
TP-14 IF AGC
IC 401 AN321 RF AFC
IC501 HA1154 or HA11107 SOUND IF & AUDIO
SIF AMP & LIMITER
AMP
BUFFER
AUDIO DRIVE
DETECTOR
X201 2SC1213A VIDEO BUFFER
VIDEO EQ
TP-22 AUDIO
TP-72 VIDEO
AUDIO OUT
AUDIO IN
GND
REMOTE PAUSE
VIDEO IN
VIDEO OUT
ANT IN
RF OUT
0 1 TERMINAL ASSEMBLY
BOOSTER & MIXER
RF CONVERTOR
REMOTE PAUSE
0 8 MECHA CON
AUTO/COLOUR/B/W/CH SET MODE SW
VOLTAGE SELECTOR
110V
127V
220V
240V
AC IN 50Hz 110/127/220/240
MAIN SW
1 5 HEATER
AC 15V IN
2 2 POWER 2SD389-OX2
0 7 J BOARD
18V IN
12V IN
GND
RY CTL
AUDIO OUT
GND
AUDIO IN
REC 12V OUT
0 6 AUDIO & SERVO
X1 2SC1213
X2 2SC828Q
12V ADJ
0 2 REGULATOR PWB
MAIN SW (BLU)
TIMER SET IN
AC 7V IN
RY CTL OUT
12V IN
2 5 TIMER
5V OUT
RY CTL
P.SW
1 1 REC SELECT SWITCH
TV
AUX
12V
MODE SW
CH. SET
VIDEO OUT
VIDEO IN
0 4 Y & C
TIMER
ON
OFF
P.LAMP
1 0 FUNCTION SWITCH

NOTE: All voltages are DC measured with a VTVM.

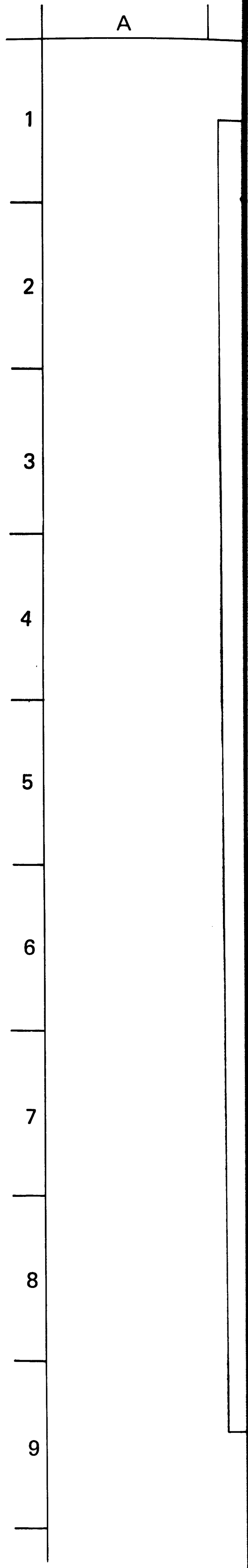
( ) represents the DC voltage measured at record mode.

NOTE: Unless otherwise specified;

All resistance values are in ohms 1/4 W, ±10%.

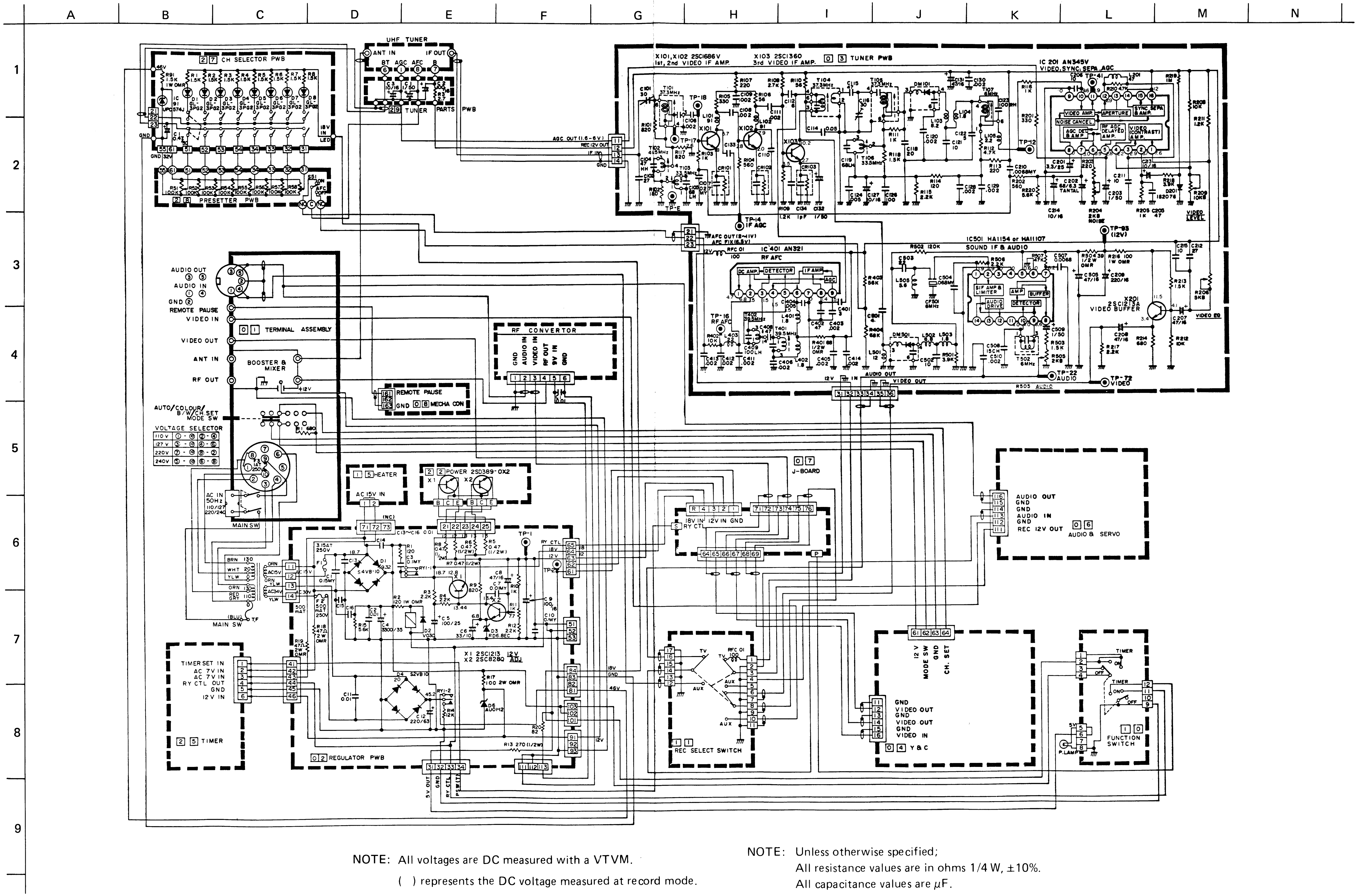
All capacitance values are μF.

10.18 TUNER SCHEM



A
1
2
3
4
5
6
7
8
9

10.18 TUNER SCHEMATIC DIAGRAM (HR-3330EK)


UHF TUNER
ANT IN
IF OUT
BT AGC AFC B
TUNER PARTS PWB
2 7 CH SELECTOR PWB
2 8 PRESETTER PWB
X101, X102 2SC1686V 1st, 2nd VIDEO IF AMP.
X103 2SC1360 3rd VIDEO IF AMP.
0 3 TUNER PWB
IC 201 AN345V VIDEO, SYNC, SEPA, AGC
VIDEO AMP.
APERTURE
SYNC SEPA & AMP.
NOISE CANCEL
AGC DET & AMP.
RF AGC DELAYED AMP.
VIDEO (CONTRAST) AMP.
TP-18
TP-17
TP-14 IF AGC
TP-12
TP-41
TP-93 (12V)
AGC OUT (1.6~6V)
REC 12V OUT
IF IN
GND
AFC OUT (2~11V)
AFC FIX (6.5V)
IC501 HA1154 or HA11107 SOUND IF & AUDIO
IC 401 AN321 RF AFC
DC AMP
DETECTOR
IF AMP
AGC
SIF AMP & LIMITER
AMP
BUFFER
AUDIO DRIVE
DETECTOR
TP-16 RF AFC
TP-22 AUDIO
TP-72 VIDEO
X201 2SC1213A VIDEO BUFFER
VIDEO LEVEL
VIDEO EQ
AUDIO OUT
VIDEO OUT
AUDIO OUT
AUDIO IN
GND
REMOTE PAUSE
VIDEO IN
VIDEO OUT
ANT IN
RF OUT
0 1 TERMINAL ASSEMBLY
BOOSTER & MIXER
RF CONVERTOR
GND AUDIO IN VIDEO IN RF OUT 9V IN GND
REMOTE PAUSE
GND 0 8 MECHA CON
AUTO/COLOUR/B/W/CH.SET MODE SW
VOLTAGE SELECTOR
110V
127V
220V
240V
AC IN 50Hz 110/127 220/240
MAIN SW
1 5 HEATER
AC 15V IN
2 2 POWER 2SD389-0X2
X1 X2
TP-1
TP-2
X1 2SC1213 12V
X2 2SC828Q ADJ
0 2 REGULATOR PWB
5 V OUT GND RY CTL P.SW(TL)
TIMER SET IN
AC 7V IN
AC 7V IN
RY CTL OUT
GND
12 V IN
2 5 TIMER
0 7 J-BOARD
18V IN
12V IN
GND
RY CTL
AUDIO OUT
GND
GND
AUDIO IN
GND
REC 12V OUT
0 6 AUDIO & SERVO
TV
RFC 01
AUX
1 1 REC SELECT SWITCH
12 V MODE SW GND CH. SET
GND
VIDEO OUT
GND
VIDEO OUT
GND
VIDEO IN
0 4 Y & C
TIMER
ON
OFF
P.LAMP
1 0 FUNCTION SWITCH
A B C D E F G H I J K L M N
1 2 3 4 5 6 7 8 9

NOTE: All voltages are DC measured with a VTVM.

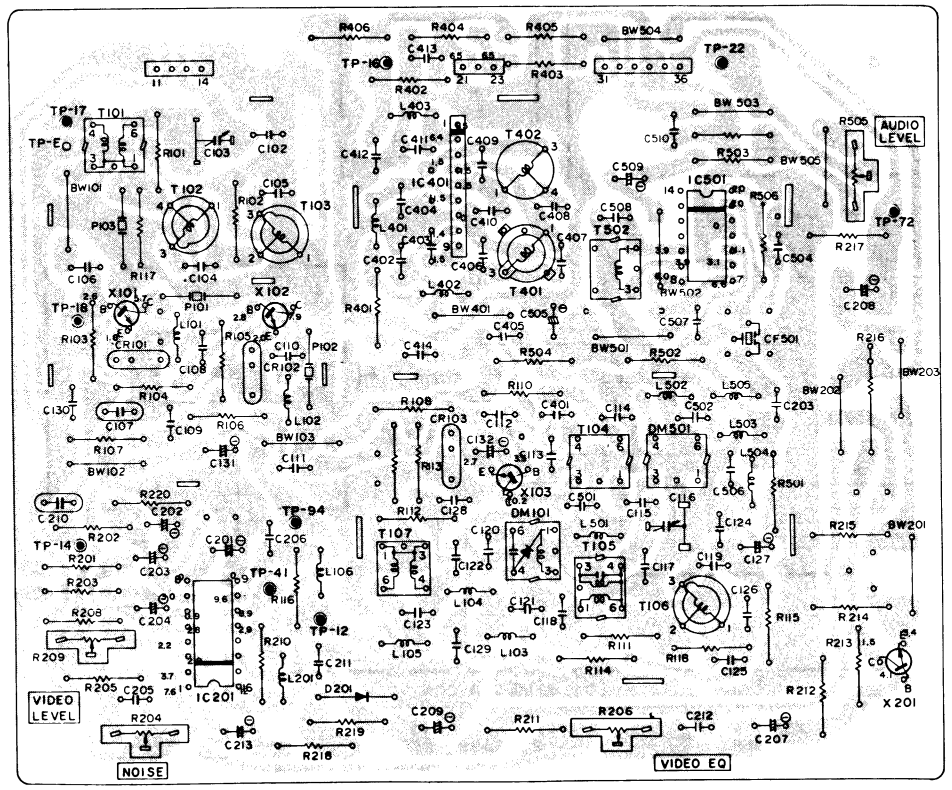
( ) represents the DC voltage measured at record mode.

NOTE: Unless otherwise specified;

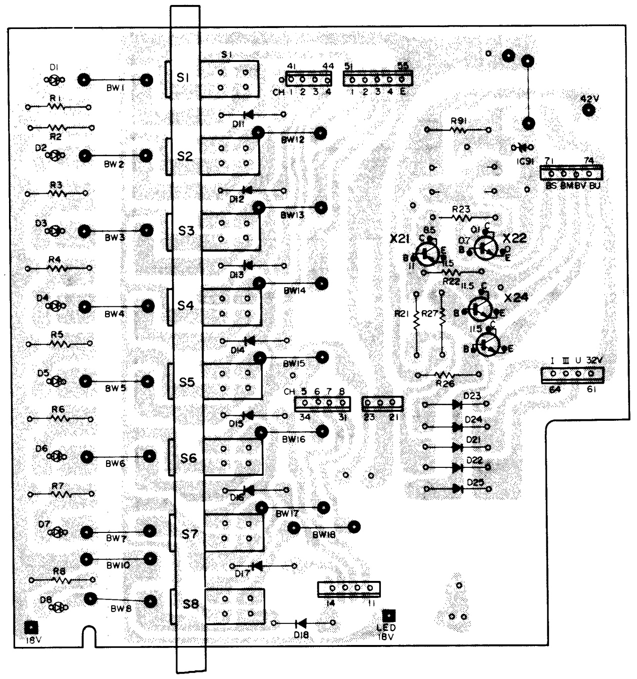
All resistance values are in ohms 1/4 W, ±10%.

All capacitance values are μF.

10.19 TUNER CIRCUIT BOARD AND CH SELECTOR



AUDIO LEVEL
VIDEO LEVEL
NOISE
VIDEO EQ
IC201
IC501
T101
T102
T103
T401
T402
T502
X101
X102
X201
TP-17
TP-E
TP-18
TP-14
TP-41
TP-12
TP-94
TP-16
TP-22
TP-72

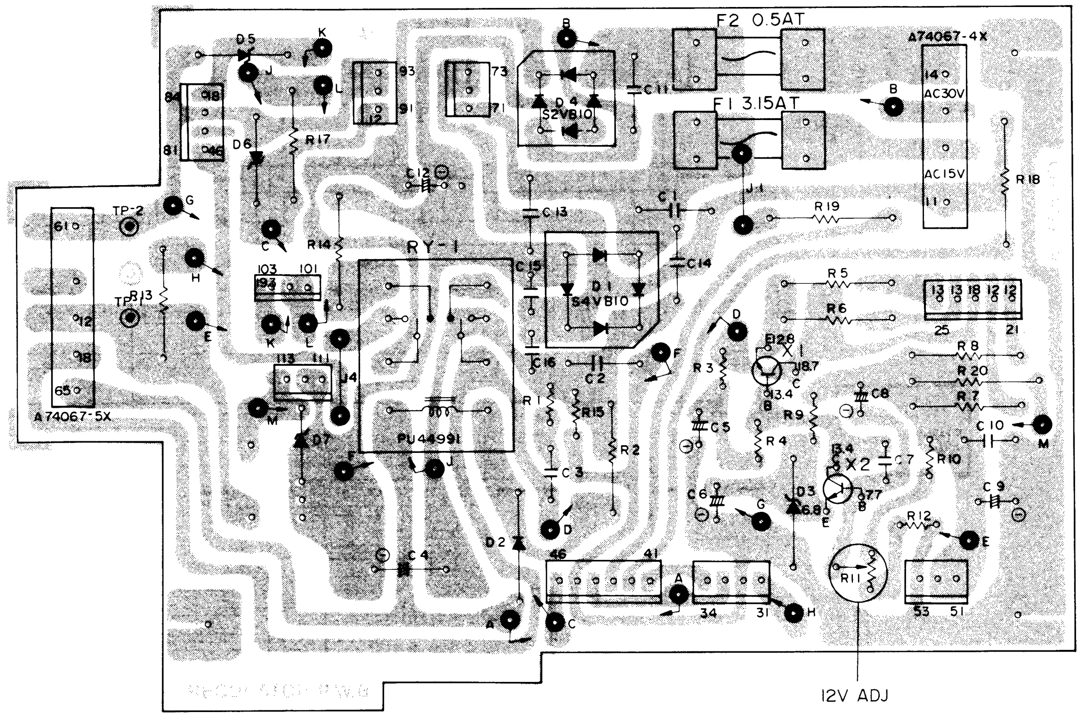


S1
S2
S3
S4
S5
S6
S7
S8
X21
X22
X24
IC31
42V
32V
18V
LED 18V

All voltages are DC measured with a VTVM.
( ) represents the DC voltage measured at record mode.

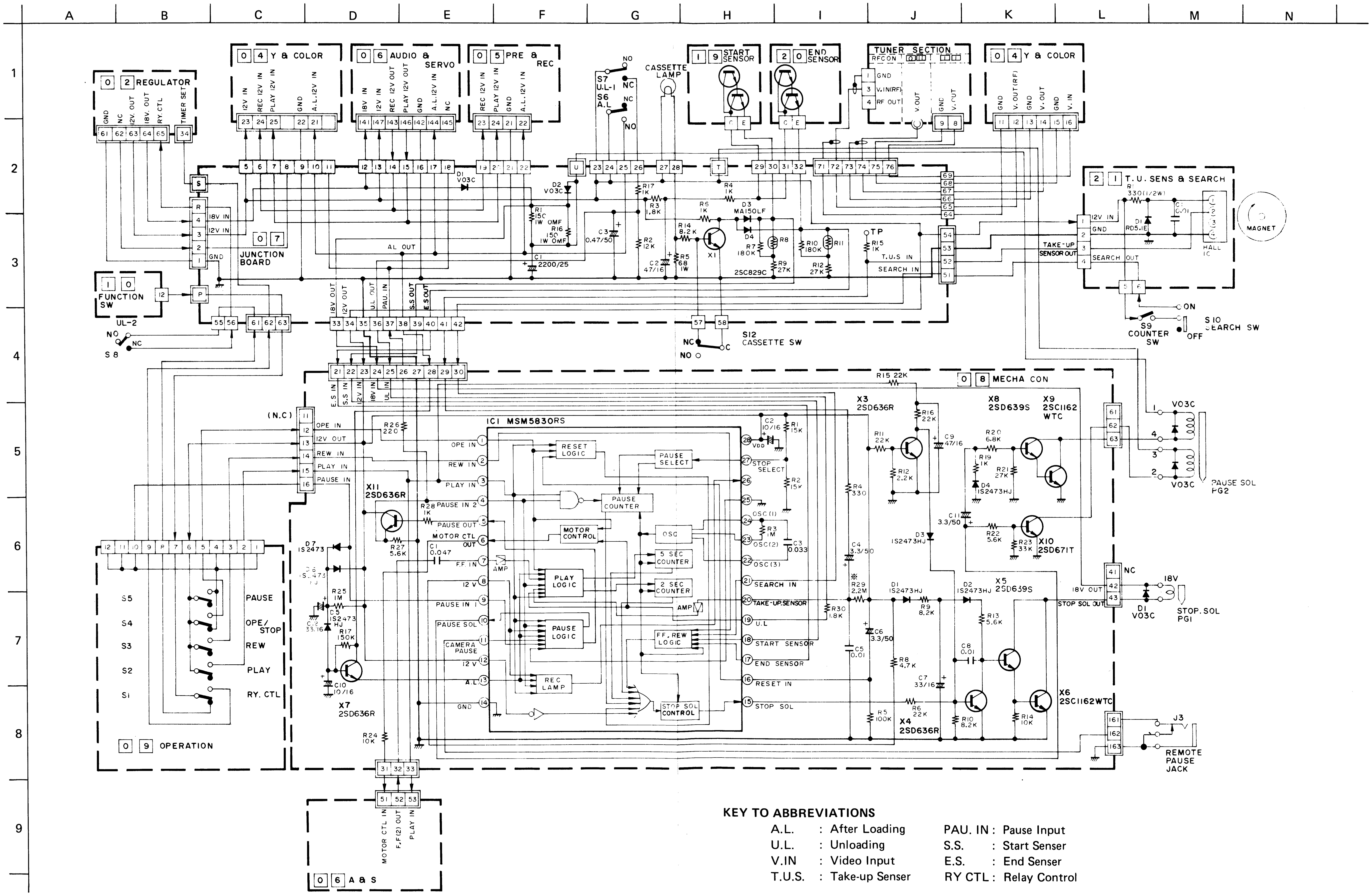
NOTE: Unless otherwise specified;
All resistance values are in ohms 1/4 W, ±10%.
All capacitance values are μF.

10.20 REGULATOR CIRCUIT BOARD



F2 0.5AT
F1 3.15AT
A74067-4X
A74067-5X
AC30V
AC15V
RY-1
S2VB10
S4VB10
PU4499I
TP-2
X1
X2
R11
12V ADJ

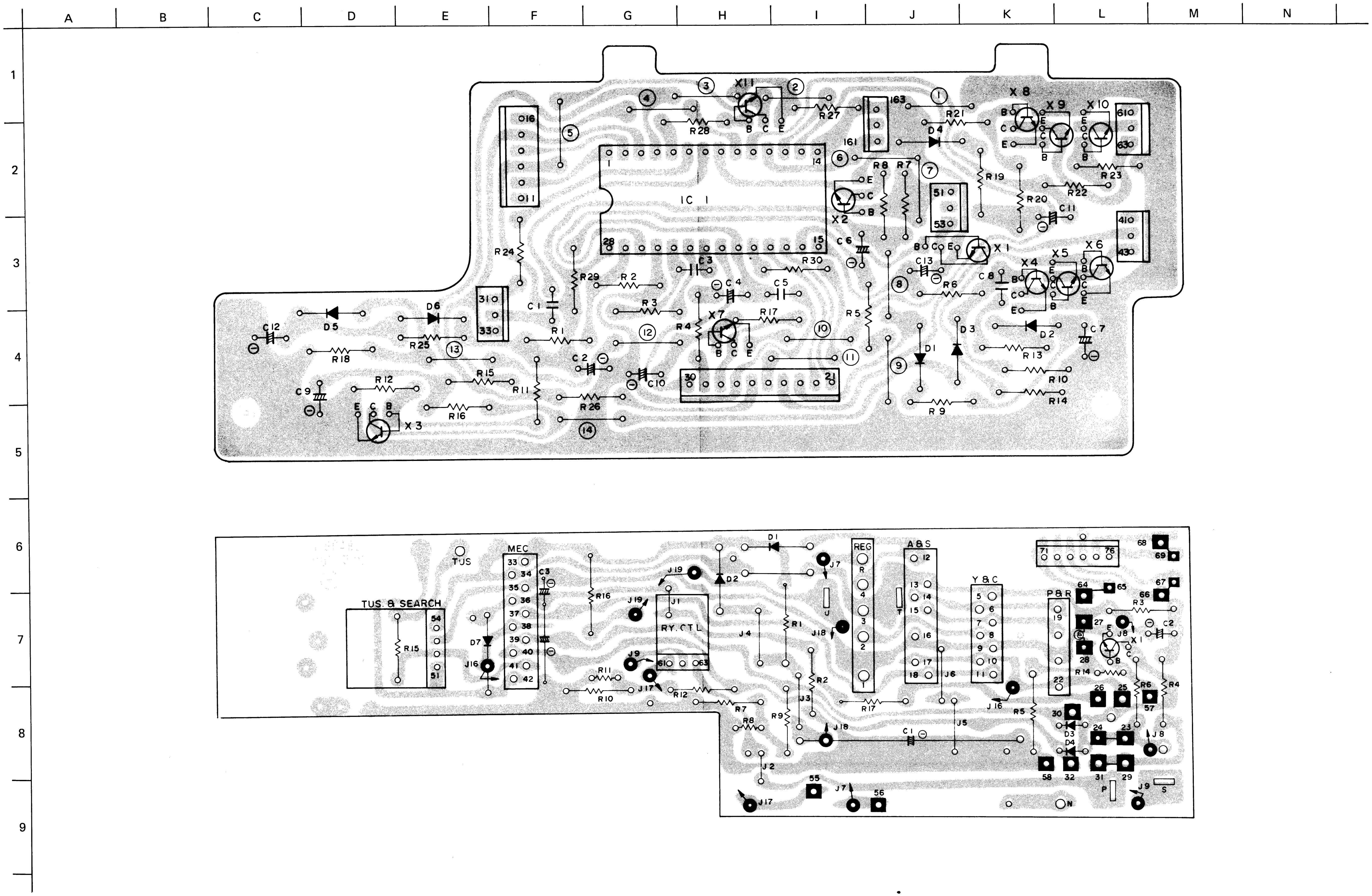
10.21 MECHANISM CONTROL CIRCUIT AND JUNCTION BOARD SCHEMATIC DIAGRAM


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
02 REGULATOR
GND
NC
12V. OUT
18V. OUT
RY. CTL
TIMER SET
04 Y & COLOR
12V IN
REC 12V IN
PLAY 12V IN
GND
A.L.12V IN
06 AUDIO & SERVO
18V IN
12V IN
REC 12V OUT
PLAY 12V OUT
GND
A.L. 12V IN
NC
05 PRE & REC
REC 12V IN
PLAY 12V IN
GND
A.L. 12V IN
S7 U.L-I
S6 A.L
NO
NC
CASSETTE LAMP
19 START SENSOR
20 END SENSOR
TUNER SECTION
RFCON
GND
V.IN(RF)
RF OUT
V.OUT
GND
V.OUT
04 Y & COLOR
GND
V.OUT(RF)
GND
V.OUT
GND
V.IN
07 JUNCTION BOARD
18V IN
12V IN
GND
AL OUT
D1 V03C
D2 V03C
R1 15Ω 1W OMF
R16 15Ω 1W OMF
C1 2200/25
C3 0.47/50
R17 1K
R3 1.8K
R2 12K
R14 8.2K
C2 47/16
R5 68 1W
R6 1K
R4 1K
D3 MA150LF
D4
R7 180K
R8
X1 2SC829C
R9 27K
R10 180K
R11
R12 27K
TP
R15 1K
T.U.S IN
SEARCH IN
18V OUT
12V OUT
UL OUT
PAU. IN
S.S OUT
E.S OUT
10 FUNCTION SW
UL-2
S8
S12 CASSETTE SW
21 T.U. SENS & SEARCH
R1 330(1/2W)
C1 0.01
D1 RD5.1E
12V IN
GND
TAKE-UP SENSOR OUT
SEARCH OUT
HALL IC
MAGNET
ON
OFF
S9 COUNTER SW
S10 SEARCH SW
08 MECHA CON
IC1 MSM5830RS
OPE IN
REW IN
PLAY IN
PAUSE IN 2
PAUSE OUT
MOTOR CTL OUT
F.F. IN
12 V
PAUSE IN
PAUSE SOL
CAMERA PAUSE
A.L.
GND
VDD
STOP SELECT
OSC (1)
OSC (2)
OSC (3)
SEARCH IN
TAKE-UP SENSOR
U.L
START SENSOR
END SENSOR
RESET IN
STOP SOL
RESET LOGIC
PAUSE SELECT
PAUSE COUNTER
MOTOR CONTROL
OSC
5 SEC COUNTER
PLAY LOGIC
2 SEC COUNTER
AMP
PAUSE LOGIC
FF, REW LOGIC
REC LAMP
STOP SOL CONTROL
(N.C)
OPE IN
12V OUT
REW IN
PLAY IN
PAUSE IN
R26 220
X11 2SD636R
R28 1K
R27 5.6K
C1 0.047
D7 1S2473
D8 1S2473
R25 1M
C5 1S2473 HJ
R17 150K
C10 10/16
X7 2SD636R
R24 10K
E.S IN
S.S IN
12V IN
18V IN
UL IN
R15 22K
C2 10/16
R1 15K
R2 15K
R3 1M
C3 0.033
X3 2SD636R
R16 22K
R11 22K
R12 2.2K
C9 47/16
R4 330
C4 3.3/50
R29 2.2M
R30 1.8K
C6 3.3/50
C5 0.01
R5 100K
D1 1S2473HJ
D2 1S2473HJ
D3 1S2473HJ
R9 8.2K
R8 4.7K
C7 33/16
R6 22K
R10 8.2K
X4 2SD636R
X8 2SD639S
X9 2SC1162 WTC
R20 6.8K
R19 1K
R21 27K
D4 1S2473HJ
C11 3.3/50
R22 5.6K
R23 33K
X10 2SD671T
X5 2SD639S
R13 5.6K
C8 0.01
R14 10K
X6 2SC1162WTC
NC
18V OUT
STOP SOL OUT
V03C
PAUSE SOL PG2
18V
D1 V03C
STOP. SOL PG1
J3
REMOTE PAUSE JACK
09 OPERATION
S5
S4
S3
S2
S1
PAUSE
OPE/ STOP
REW
PLAY
RY. CTL
06 A & S
MOTOR CTL IN
F.F(2) OUT
PLAY IN

KEY TO ABBREVIATIONS

A.L.	After Loading	PAU. IN	Pause Input
U.L.	Unloading	S.S.	Start Senser
V.IN	Video Input	E.S.	End Senser
T.U.S.	Take-up Senser	RY CTL	Relay Control

10.22 MECHANISM CONTROL CIRCUIT AND JUNCTION BOARD


A
B
C
D
E
F
G
H
I
J
K
L
M
N
1
2
3
4
5
6
7
8
9
IC 1
X1
X2
X3
X4
X5
X6
X7
X8
X9
X10
X11
D1
D2
D3
D4
D5
D6
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
R29
R30
TUS
TUS. & SEARCH
MEC
RY. CTL
REG
A & S
Y & C
P & R
J1
J2
J3
J4
J5
J6
J7
J8
J9
J16
J17
J18
J19
D7

SECTION 11
ELCTRICAL PARTS LIST BY ASSEMBLIES

11.1 HOW TO READ THE JVC ELECTRICAL STANDARD PARTS NUMBERS. 11 - 3
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  11.2.4 PRE & REC P.W.B. ASS'Y 05 11-25
  11.2.5 AUDIO & SERVO P.W.B. ASS'Y 06 11-28
  11.2.6 JUNCTION P.W.B. ASS'Y 07 11-34
  11.2.7 MECHA. CON. P.W.B. ASS'Y 08 11-35
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- 11.3.4 PRE & REC P.W.B. ASS'Y 05 11-61
- 11.3.5 AUDIO & SERVO P.W.B. ASS'Y 06 11-64
- 11.3.6 JUNCTION P.W.B. ASS'Y 07 11-70
- 11.3.7 MECHA. CON. P.W.B. ASS'Y 08 11-71
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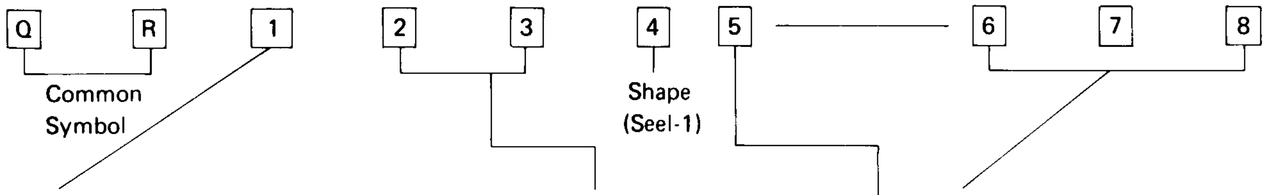
- 11.3.14 FULL ERASE HEAD P.W.B. 17 11-73
- 11.3.15 START SENSOR P.W.B. 19 11-74
- 11.3.16 END SENSOR P.W.B. 20 11-74
- 11.3.17 T-U SENSOR & SEARCH P.W.B. 21 11-74
- 11.3.18 POWER TR. P.W.B. (Regulator) 22 11-74
- 11.3.19 POWER TR. P.W.B. (A/S) 23 11-74
- 11.3.20 TERMINAL P.W.B. (Video Head) 24 11-75
- 11.3.21 TIMER P.W.B. ASS'Y 25 11-75
- 11.3.22 CH. SELECTOR P.W.B. ASS'Y 27 11-76
- 11.3.23 PRE SETTER P.W.B. ASS'Y 28 11-76
- 11.3.24 TERMINAL P.W.B. ASS'Y (Tuner) 29 11-76
- 11.3.25 MODE SELECT P.W.B. 30 11-77

11.1 HOW TO READ THE JVC ELECTRICAL STANDARD PARTS NUMBERS

11.1.1 FIXED RESISTOR



Type of resistor

C	Fixed Resistor
D	Carbon Resistor
F	Unflamable Resistor
G	Oxide Metal Resistor
M	Metal Plate Resistor
X	Metallized Resistor
W	Wire Wound Resistor
Y	Wire Wound Resistor
Z	Special Resistor

Rated Wattage

Symbol	Rated wattage
16	1/6 (W)
18	1/8 "
14	1/4 "
12	1/2 "
01	1 "
02	2 "
03	3 "
04	4 "
05	5 "
06	6 "
07	7 "
75	7.5 "
08	8 "
10	10 "
15	15 "
20	20 "
30	30 "

Values

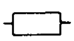
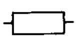
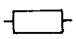
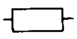
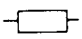
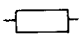
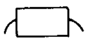
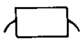
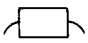
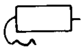
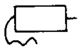
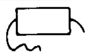
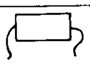
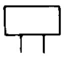
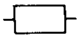
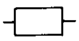
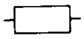
– Example –

R47		0.47 Ω
4R7		4.7 Ω
470	$47X10^{0}$	47 Ω
471	$47X10^{1}$	470 Ω
472	$47X10^{2}$	4.7 KΩ
473	$47X10^{3}$	47 KΩ
474	$47X10^{4}$	470 KΩ
475	$47X10^{5}$	4.7MΩ

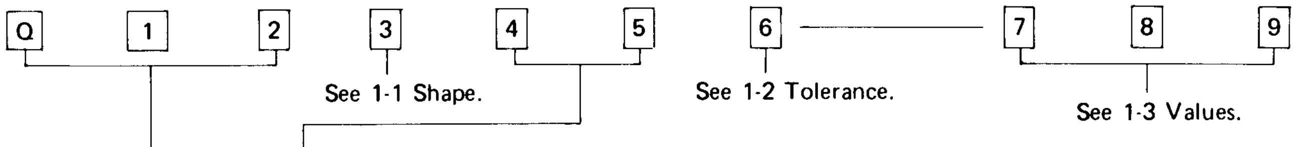
Tolerance

Symbol	Tolerance
F	± 1%
G	± 2%
J	± 5%
K	±10%
M	±20%

1-1 Shape of resistor

Sort	C	D	G	F	M	W	X	Y
1								
2								
3								
4								
5						L type		
6						Resin Covered		
7						Enameled		

11.1.2 FIXED CAPACITOR



Rated voltage (V)

2nd letter \ First letter	A	B	C	D	E	F	G	H	J	K	V
0									6.3		
1	10		16	20	25		40	50	63		35
2	100	125	160	200	250	315	400	500	630		350
3	1000			2000				5000			

Type of capacitor

Symbol	Type of capacitor
QCF	Ceramic
QCS	"
QCY	"
QEA	Electrolytic (characteristic A)
QED	Electrolytic (characteristic B)
QEE	Tantalum
QEN	Non-polar
QEW	Electrolytic (characteristic W)
QFC	OF
QFF	Film mica
QFH	Metalized mylar
QFM	Mylar
QFP	Paper film
QFS	Polystyrole
QCT	Ceramic
QCZ	Special
QEZ	
QFZ	

1-2 Tolerance

Symbol	J	K	M	Z	P	A	H
(%)	±5	±10	±20	+80 −20	+100 − 0	+100 − 10	+50 −10

1-3 Values

– Example – Values are in picofarad

101 ...... $10X10^1$ ...... 100 pF

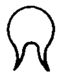
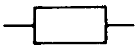
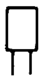
102 ...... $10X10^2$ ...... 1,000 pF

103 ...... $10X10^3$ ...... 10,000 pF = 0.01 μF

104 ...... $10X10^4$ ...... 100,000 pF = 0.1 μF

5R0 ...... $10X10^5$ ...... 5 pF

1-1 Shape of capacitor

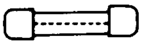
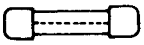
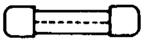
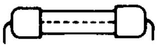
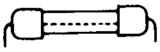
1	
2	
3	Kink lead
4	

11.1.3 FUSE

Q M F 1 2 3 4 ——— 5 6 7

Q M F: COMMON SYMBOL

1 2: Shape of Fuse

Symbol No.	Shape
51	
60	
61	
63	
66	

3: Characteristics

4: Rated Voltage

Symbol No.	Rated Voltage
1	AC 125 V
2	AC 250 V

5 6 7: Rated Current (A)

0.1			0.2	0.25	0.3	0.4	0.5	0.6	0.8
1.0	1.2	1.6	2.0	2.5	3.0	4.0	5.0	6.0 6.3	8.0
10									

– Example –

0.1 A R10

1.2 A 1R2

5.0 A 5R0

10 A 100

Characteristics

Symbol No.	Fusing current	Fusing time	Remarks
S	160%	Within 1 hr.	UL type
	200%	Within 2 min.	
	800%–2000%	Within 0.01 sec.	
M	135%	Within 1 hr.	
	200%	Within 2 min.	
U	135%	Within 1 hr.	UL type
	200%	Within 2 min.	
	800%–2000%	Within 0.01 sec.	
A	210%	Within 2 min.	Europe type
	275%	0.5–10 sec.	
	400%	0.15–0.3 sec.	
	1000%	0.02–0.3 sec.	
B	210%	Within 30 min.	SEMKO type (Europe)
	275%	0.05–2 sec.	
	400%	0.01–0.5 sec.	
	1000%	Within 0.02 sec.	

11.2 ELECTRICAL PARTS LIST BY ASSEMBLIES FOR HR-3330EG

11.2.1 REGULATOR PWB ASS'Y $\boxed{0}\boxed{2}$ VH9001A5

Symbol No.	Part No.	Part Name		Q'ty
X 1	2SC1213AD	Transistor		
X 2	2SC828Q	"		
D 1	S4VB10	Diode Stack		
D 2	VO3C	Diode		
D 3	RD6.8EC	Zener Diode		
D 4	S2VB10	Diode Stack		
D 5	—	—		
D 6	AU01-12	Zener Diode		
R 1	QRD143K-121	CR		
R 2	QRG016J-121	OMR		
R 3	QRD143K-222	CR		
R 4	" -222	"		
R 5	QRW125J-R47	WR		
R 6	" -R47	"		
R 7	" -R47	"		
R 8	" -R47	"		
R 9	QRD143K-821	CR		
R10	" -102	"		
R11	QVP4A0B-102	VR		
R12	QRD143K-222	CR		
R13	QRD122J-271	"		
R14	" -123	"		
R15	QRD143K-562	"		
R16	—	—		
R17	QRG026J-101	OMR		
R18	" -470	"		
R19	" -470	"		
R20	QRD142J-820	"		
C 1	QFM71HK-154	M Cap		
C 2	QCF32HP-103	C Cap		
C 3	QFZ0021-104	M Cap		
C 4	QEW71VH-338	E Cap		
C 5	QEW61EA-107	"		
C 6	QEW61AA-336	"		
C 7	QFZ0021-103	M Cap		
C 8	QEW61CA-476	E Cap		
C 9	" -107	"		
C10	QFZ0021-104	M Cap		
C11	QCF32HP-103	C Cap		
C12	QEW51JA-227	E Cap		
C13	QCF32HP-103	C Cap		
C14	" -103	"		
C15	QCF31HP-103	"		
C16	" -103	"		
F 1	QMF51A2-3R15	Fuse		
F 2	" -R50	"		
	A44594-001	Fuse Clip		4
RY1	PU44991	Relay		

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU43351-3	Cap Housing		4
	〃 -4	〃		2
	PU43351-5	Cap Housing		1
	〃 -6	〃		1
	A75802-4	Connector Base		1
	〃 -5	〃		1
	A49796	Tab		2
	GK35050	Caution Mark		—
	PU43092	Spacer		14
	PU44682	Heat Sink		1
	LPSP3014ZS	Screw	For Heat Sink	1
	WNS3000NS	Washer		1
	NNB3000NS	Nut		1

11.2.2 TUNER PWB ASS'Y 0 3 VH1001A

Symbol No.	Part No.	Part Name	Description	Q'ty
IC101	AN345V	Integrated Circuit		
IC401	AN321	″		
IC501	HA11107	″	or HA1154	
X101	2SC1686V	Transistor		
X102	″	″		
X103	2SC1360	″		
X201	2SC1213A	″		
D201	1S2076	Diode		
R101	QRD141K-821	CR		
R102	″ -561	″		
R103	″ -102	″		
R104	″ -561	″		
R105	″ -331	″		
R106	″ -560	″		
R107	″ -221	″		
R108	″ -272	″		
R109	″ -122	″		
R110	QRG129J-560	OMR		
R111	QRD141K-102	CR		
R112	″ -472	″		
R113	″ -221	″		
R114	″ -121	″		
R115	″ -222	″		
R116	″ -102	″		
R117	″ -821	″		
R118	″ -152	″		
R201	QRD141K-331	CR		
R202	″ -561	″		
R203	″ -221	″		
R204	QVZ3230-023	VR		
R205	QRD141K-102	CR		
R206	QVZ3230-053	VR		
R207	—	—		
R208	QRD141K-103	CR		
R209	QVZ3230-014	VR		
R210	QRD141K-472	CR		
R211	″ -122	″		
R212	″ -103	″		
R213	″ -153	″		
R214	″ -681	″		
R215	—	—		
R216	QRG019J-101	OMR		
R217	QRD141K-222	CR		
R218	″ -392	″		
R219	″ -105	″		
R220	″ -562	″		
R221	″ -183	″		
R401	QRG129J-680	OMR		
R402	QRD141K-103	CR		
R403	″ -563	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
R404	QRD141K-683	CR		
R501	QRD141K-392	CR		
R502	" -124	"		
R503	" -152	"		
R504	QRG129J-390	OMR		
R505	QVZ3230-023	VR		
R506	QRD141K-222	CR		
R507	" -473	"		
C101	QAT3001-010	Trimmer Cap	30 pF	
C102	QCS31HJ-270	C Cap		
C103	–	–		
C104	QCT25HH-470	C Cap		
C105	QCT25LH-680	"		
C106	QCF31EZ-202	"		
C107	QFM71HK-273	MY Cap		
C108	QCF31EZ-202	C Cap		
C109	" -202	"		
C110	QCS31HJ-120	"		
C111	QCF31EZ-202	"		
C112	QCS31HJ-6R0	"		
C113	–	–		
C114	QCF31HP-502	C Cap		
C115	QCS31HJ-470	"		
C116	QAT3001-010	Trimmer Cap	30 pF	
C117	–	–		
C118	QCS31HJ-200	C Cap		
C119	QCT25LH-680	"		
C120	QCF31EZ-202	"		
C121	QCS31HJ-100	"		
C122	" -5R0	"		
C123	QCT25RH-101	"		
C124	QCF31HP-502	"		
C125	–	–		
C126	QCS31HJ-101	C Cap		
C127	QEW51CA-106	E Cap		
C128	QCF31EZ-202	C Cap		
C129	" -202	"		
C130	" -202	"		
C131	QEW61CA-476	E Cap		
C132	QEW51HA-105	"		
C133	QCS31HJ-3R0	C Cap		
C134	" -1R0	"		
C201	QEW61EA-335	E Cap		
C202	QEE50JM-686	T Cap		
C203	QEW61HA-105	E Cap		
C204	–	–		
C205	QCS31HJ-470	C Cap		
C206	" -100	"		
C207	QEW61CA-476	E Cap		
C208	" -476	"		
C209	QEW51CA-227	"		
C210	QFM71HK-682	MY Cap		
C211	QCS31HJ-100	C Cap		

Symbol No.	Part No.	Part Name	Description	Q'ty
C212	QCS31HJ-270	C Cap		
C213	QEW61CA-106	E Cap		
C214	QEW51CA-106	″		
C215	QCS31HJ-100	C Cap		
C401	QCS31HJ-3R0	C Cap		
C402	″ -470	″		
C403	QCF31EZ-202	″		
C404	QCF31HP-502	″		
C405	QCF31EZ-202	″		
C406	″ -202	″		
C407	–	–		
C408	QCF31HJ-470	C Cap		
C409	QCT25LH-101	″		
C410	–	–		
C411	QCF31EZ-202	C Cap		
C412	″ -202	″		
C413	″ -202	″		
C414	″ -202	″		
C501	QCS31HJ-4R0	C Cap		
C502	″ -100	″		
C503	″ -220	″		
C504	QFM71HK-683	MY Cap		
C505	QEW51CA-476	E Cap		
C506	–	–		
C507	QFM71HK-332	MY Cap		
C508	QCT25CH-150	C Cap		
C509	QEW61HA-105	″		
C510	QCF31EZ-202	″		
L101	A74979-R91	Peaking Coil		
L102	″ -R91	″		
L103	A04725-8.2	″		
L104	″ -1.8	″		
L105	″ -2.2	″		
L201	A04725-47	Peaking Coil		
L401	A04725-1.8	Peaking Coil		
L402	″ -1.8	″		
L403	″ -2.2	″		
L501	A04725-12	Peaking Coil		
L502	″ -6.8	″		
L503	″ -1.8	″		
L504	–	–		
L505	A04725-5.6	Peaking Coil		
T101	A75217	Coupling Trans.		
T102	A75219	Adj. S. Trap Trans.		
T103	A74657	S. Trap Trans.		
T104	A75084	3rd PIF Trans.		
T105	A75085	Def. Trans.		
T106	A75086	S. Trap Trans.		

Symbol No.	Part No.	Part Name	Description	Q'ty
T107	A74762	4.5 Trap Trans.		
T401	A75310	M. Coil		
T402	A75291	AFC Trans.		
T502	A75072	S. IF Trans.		
CF501	A75088	Ceramic Filter		
CR101	A75205-221	CR Block		
CR102	" -221	"		
CR103	" -221	"		
DM101	A75116	Det. Module		
DM501	A74664-C	"		
P101	A75087	Piezonator		
RFC1	QQL043K-101	Peaking Coil		
	A74138-2	Tab		10
	PU43351-3	Cap. Housing		1
	" -4	"		1
	" -6	"		1
	PU44816	Rod Holder		1
	C40189	Shield Case		1
	C40190	Shield Bridge L.		1
	C40191-2	Shield Top L.		1
	C40192	Shield Bottom L.		1
	C40193	Shield Case L.		1
	C40194	Shield Bridge S.		1
	C40195-2	Shield Top S.		1
	C40196	Shield Bottom S.		1
	A75375	Name Label		1

11.2.3 Y & COLOUR PWB ASS'Y 0 4 PU47178A

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	AN302	Integrated Circuit		
IC 2	12V104	"		
IC 3	VC2019	"		
IC 4	AN316	"		
IC 5	AN303	"		
IC 6	8V301	"		
IC 7	SN76670N	"		
IC 8	9V107	"		
IC 9	VC2011M	"		
IC10	SN76670N	"		
IC11	MSM4069	"		
IC201	VC2011M	Integrated Circuit		
IC202	AN305	"		
IC203	AN608	"		
IC204	AN236	"		
IC205	UPC741C	"		
IC206	"	"		
IC207	MN6061A	"		
IC208	AN337	"		
X 1	2SC2063Q	Transistor		
X 2	"	"		
X 3	"	"		
X 4	2SK40C	F.E. Transistor		
X 5	2SC2063Q	Transistor		
X 6	"	"		
X 7	"	"		
X 8	"	"		
X 9	"	"		
X201	2SK40C	F.E. Transistor		
X202	2SC2063Q	Transistor		
X203	"	"		
X204	"	"		
X205	"	"		
X206	2SA786Q	"		
X207	"	"		
X208	2SB643R	"		
X209	2SC2063Q	"		
X210	"	"		
X211	"	"		
X212	2SB643R	"		
X213	2SC2063Q	"		
X214	2SD639S	"		
X215	–	–		
X216	2SC2063Q	Transistor		
X217	2SD786Q	"		
X218	2SC2063Q	"		
X219	"	"		
X220	2SB643R	"		
D 1	OA90	Diode		
D 2	1S2473HJ	"		

Symbol No.	Part No.	Part Name	Description	Q'ty
D 3	MA150	Diode		
D 4	〃	〃		
D 5	OA90	〃		
D 6	〃	〃		
D 7	〃	〃		
D 8	〃	〃		
D 9	〃	〃		
D10	1S2473HJ	〃		
D11	〃	〃		
D12	OA91	〃		
D13	1S2473HJ	〃		
D14	〃	〃		
D15	〃	〃		
D16	〃	〃		
D17	〃	〃		
D18	〃	〃		
D201	1S2473HJ	Diode		
D202	〃	〃		
D203	MA150	〃		
D204	〃	〃		
D205	1S2473HJ	〃		
D206	MA150	〃		
D207	〃	〃		
D208	1S2473HJ	〃		
D209	〃	〃		
D210	〃	〃		
D211	〃	〃		
D212	〃	〃		
D213	〃	〃		
D214	〃	〃		
D215	MA26T-A	〃		
D216	1S2473HJ	〃		
D217	〃	〃		
D218	〃	〃		
D219	〃	〃		
D220	〃	〃		
D221	〃	〃		
D222	MA150	〃		
R 1	QRD187J-750	CR		
R 2	〃 -102	〃		
R 3	〃 -681	〃		
R 4	〃 -471	〃		
R 5	〃 -122	〃		
R 6	〃 -681	〃		
R 7	〃 -561	〃		
R 8	〃 -560	〃		
R 9	—	—		
R10	QRD187J-102	CR		
R11	〃 -152	〃		
R12	QVP4A0B-103	VR		
R13	QRD187J-682	CR		
R14	〃 -820	〃		
R15	〃 -561	〃		

Symbol No.	Part No.	Part Name	Description	Q'ty
R16	—	—		
R17	QRD187J-332	CR		
R18	—	—		
R19	QRD187J-822	CR		
R20	QVP4A0B-471	VR		
R21	QRD187J-821	CR		
R22	〃 -472	〃		
R23	〃 -472	〃		
R24	〃 -392	〃		
R25	〃 -472	〃		
R26	QVP4A0B-472	VR		
R27	QRD187J-122	CR		
R28	〃 -122	〃		
R29	〃 -222	〃		
R30	QRD141K-181	〃		
R31	QRD187J-121	〃		
R32	〃 -331	〃		
R33	〃 -271	〃		
R34	〃 -331	〃		
R35	〃 -391	〃		
R36	QVP4A0B-222	VR		
R37	〃 -222	〃		
R38	QRD187J-102	CR		
R39	QRZ0047-220	Fusible R		
R40	QRD187J-100	CR		
R41	〃 -391	〃		
R42	〃 -223	〃		
R43	〃 -102	〃		
R44	〃 -562	〃		
R45	〃 -102	〃		
R46	〃 -102	〃		
R47	〃 -152	〃		
R48	〃 -272	〃		
R49	〃 -391	〃		
R50	〃 -392	〃		
R51	〃 -391	〃		
R52	〃 -470	〃		
R53	〃 -391	〃		
R54	QVP4A0B-471	VR		
R55	QRD187J-474	CR		
R56	〃 -101	〃		
R57	〃 -104	〃		
R58	〃 -222	〃		
R59	〃 -221	〃		
R60	〃 -102	〃		
R61	〃 -102	〃		
R62	〃 -103	〃		
R63	〃 -182	〃		
R64	〃 -153	〃		
R65	〃 -153	〃		
R66	QVP4A0B-102	VR		
R67	QRD187J-102	CR		
R68	〃 -102	〃		
R69	〃 -821	〃		

Symbol No.	Part No.	Part Name	Description	Q'ty
R70	QRD187J-152	CR		
R71	〃 -121	〃		
R72	〃 -332	〃		
R73	〃 -122	〃		
R74	QRD141K-561	〃		
R75	QRD187J-103	〃		
R76	〃 -333	〃		
R77	〃 -122	〃		
R78	〃 -152	〃		
R79	〃 -221	〃		
R80	〃 -561	〃		
R81	QVP4A0B-223	VR		
R82	QRD187J-154	CR		
R83	〃 -152	〃		
R84	〃 -273	〃		
R85	〃 -562	〃		
R86	〃 -102	〃		
R87	〃 -102	〃		
R88	QRG126J-101	OMF R		
R89	QVP4A0B-223	VR		
R90	QRD187J-222	CR		
R91	〃 -154	〃		
R92	〃 -102	〃		
R93	〃 -222	〃		
R94	〃 -182	〃		
R95	〃 -391	〃		
R96	〃 -152	〃		
R97	〃 -154	〃		
R98	QVP4A0B-223	VR		
R99	QRD187J-821	CR		
R100	〃 -122	〃		
R101	〃 -153	〃		
R102	〃 -682	〃		
R103	〃 -222	〃		
R104	QVP4A0B-682	VR		
R105	QRD187J-223	CR		
R106	〃 -472	〃		
R107	〃 -103	〃		
R108	〃 -562	〃		
R109	〃 -221	〃		
R110	〃 -104	〃		
R111	〃 -472	〃		
R112	〃 -222	〃		
R201	QRD187J-391	CR		
R202	〃 -102	〃		
R203	〃 -391	〃		
R204	〃 -102	〃		
R205	〃 -472	〃		
R206	〃 -222	〃		
R207	〃 -221	〃		
R208	〃 -222	〃		
R209	〃 -472	〃		
R210	〃 -103	〃		

Symbol No.	Part No.	Part Name	Description	Q'ty
R211	QRD187J-104	CR		
R212	″ -105	″		
R213	″ -473	″		
R214	″ -154	″		
R215	QVP4A0B-222	VR		
R216	″ -103	″		
R217	QRD187J-103	CR		
R218	″ -103	″		
R219	″ -182	″		
R220	″ -182	″		
R221	″ -221	″		
R222	″ -472	″		
R223	″ -272	″		
R224	″ -102	″		
R225	″ -102	″		
R226	″ -393	″		
R227	″ -683	″		
R228	″ -221	″		
R229	″ -222	″		
R230	″ -823	″		
R231	″ -222	″		
R232	″ -563	″		
R233	″ -561	″		
R234	″ -103	″		
R235	″ -393	″		
R236	″ -151	″		
R237	″ -102	″		
R238	QVP4A0B-471	VR		
R239	—	—		
R240	QRD187J-472	CR		
R241	″ -391	″		
R242	″ -391	″		
R243	″ -391	″		
R244	″ -391	″		
R245	″ -391	″		
R246	″ -332	″		
R247	″ -102	″		
R248	″ -152	″		
R249	QVP4A0B-222	VR		
R250	QRD187J-471	CR		
R251	″ -222	″		
R252	″ -221	″		
R253	″ -153	″		
R254	″ -393	″		
R255	″ -103	″		
R256	″ -394	″		
R257	″ -103	″		
R258	″ -102	″		
R259	″ -182	″		
R260	″ -222	″		
R261	″ -104	″		
R262	″ -223	″		
R263	″ -182	″		
R264	″ -333	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
R265	–	–		
R266	QRD187J-273	CR		
R267	″ -562	″		
R268	QRG126J-151	OMF R		
R269	QRD187J-152	CR		
R270	″ -391	″		
R271	″ -102	″		
R272	″ -122	″		
R273	″ -823	″		
R274	″ -563	″		
R275	″ -561	″		
R276	″ -123	″		
R277	″ -472	″		
R278	″ -102	″		
R279	″ -564	″		
R280	″ -103	″		
R281	″ -103	″		
R282	″ -222	″		
R283	QVP4A0B-472	VR		
R284	QRD187J-392	CR		
R285	″ -102	″		
R286	″ -182	″		
R287	″ -561	″		
R288	″ -223	″		
R289	″ -102	″		
R290	″ -221	″		
R291	″ -104	″		
R292	″ -563	″		
R293	″ -101	″		
R294	″ -103	″		
R295	″ -473	″		
R296	″ -392	″		
R297	″ -183	″		
R298	″ -223	″		
R299	″ -103	″		
R300	″ -183	″		
R301	QVP4A0B-103	VR		
R302	QRD187J-223	CR		
R303	″ -562	″		
R304	″ -561	″		
R305	″ -272	″		
R306	″ -393	″		
R307	″ -472	″		
R308	″ -333	″		
R309	″ -152	″		
R310	″ -152	″		
R311	QVP4A0B-102	VR		
R312	QRJ187J-822	CR		
R313	″ -183	″		
R314	″ -271	″		
R315	QRD187J-271	″		
R316	″ -222	″		
R317	″ -822	″		
R318	″ -272	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
R319	QRD187J-102	CR		
R320	" -103	"		
R321	" -103	"		
R322	" -221	"		
R323	" -102	"		
R324	" -333	"		
R325	" -103	"		
R326	" -102	"		
R327	" -333	"		
R328	" -103	"		
R329	QRG126J-101	OMF R		
R330	QRD187J-102	CR		
R331	" -272	"		
R332	—	—		
R333	QRD187J-221	CR		
R334	" -331	"		
R335	QVP4A0B-222	VR		
R336	QRD187J-331	CR		
R337	" -222	"		
R338	" -394	"		
R339	" -332	"		
C 1	QEW61CA-476	E Cap		
C 2	QEW60JA-107	"		
C 3	" -227	"		
C 4	QCS31HJ-560	C Cap		
C 5	QEW61CA-476	E Cap		
C 6	QCF31HP-223	C Cap		
C 7	QEW60JA-476	E Cap		
C 8	QEW61AA-476	"		
C 9	QEW60JA-476	"		
C10	QCF31HP-223	C Cap		
C11	QEW60JA-227	E Cap		
C12	" -476	"		
C13	" -476	"		
C14	QEW61HA-105	"		
C15	QEN41CM-106	NP Cap		
C16	QCS31HJ-270	C Cap		
C17	QEW61CA-106	E Cap		
C18	QCS31HJ-391	C Cap		
C19	QEW61HA-105	E Cap		
C20	QEW61CA-476	"		
C21	QEW60JA-336	"		
C22	" -476	"		
C23	QCS31HJ-270	C Cap		
C24	QEW60JA-336	E Cap		
C25	QCS31HJ-471	C Cap		
C26	QEW61CA-476	E Cap		
C27	QCS31HJ-680	C Cap		
C28	QEW60JA-476	E Cap		
C29	" -476	"		
C30	QEW41CA-476	"		
C31	" -476	"		
C32	" -476	"		

Symbol No.	Part No.	Part Name	Description	Q'ty
C33	QCF31HP-223	C Cap		
C34	QEW61CA-106	E Cap		
C35	QCS31HJ-820	C Cap		
C36	QFM31HK-103	MY Cap		
C37	QCS31HJ-121	C Cap		
C38	QFM31HK-103	MY Cap		
C39	QCS31HJ-121	C Cap		
C40	QFM31HK-103	MY Cap		
C41	″ -102	″		
C42	″ -103	″		
C43	″ -103	″		
C44	QCS31HJ-101	C Cap		
C45	QFM31HK-103	MY Cap		
C46	″ -103	″		
C47	QEW61HA-105	E Cap		
C48	QFM31HK-103	MY Cap		
C49	QCF31HP-223	C Cap		
C50	QFM31HK-103	MY Cap		
C51	QCS31HJ-220	C Cap		
C52	QEW61CA-336	E Cap		
C53	QCF31HP-223	C Cap		
C54	QFM31HK-103	MY Cap		
C55	″ -103	″		
C56	QEW61AA-477	E Cap		
C57	QCF31HP-223	C Cap		
C58	QEW61CA-107	E Cap		
C59	QEW61EA-475	″		
C60	QCS31HJ-471	C Cap		
C61	QEN41CM-106	NP Cap		
C62	QCS31HJ-390	C Cap		
C63	QEW61AA-476	E Cap		
C64	QEW60JA-476	″		
C65	QEW61EA-475	″		
C66	QEW61CA-106	″		
C67	QEW61AA-476	″		
C68	QCS31HJ-150	C Cap		
C69	″ -391	″		
C70	″ -331	″		
C71	QEW61CA-106	E Cap		
C72	QCS31HJ-100	C Cap		
C73	QEW60JA-476	E Cap		
C74	QEW61CA-476	″		
C75	QEW60JA-107	″		
C76	QEW61AA-476	″		
C77	QEW61CA-336	″		
C78	QFM31HK-103	MY Cap		
C79	″ -103	″		
C80	QEW61CA-336	E Cap		
C81	QCF31HP-223	C Cap		
C82	QFM31HK-103	MY Cap		
C83	QCF31HP-223	C Cap		
C84	″ -223	″		
C85	QFM31HK-103	MY Cap		
C86	QEW61CA-336	E Cap		

Symbol No.	Part No.	Part Name	Description	Q'ty
C87	QFM31HK-103	MY Cap		
C88	QCF31HP-223	C Cap		
C89	QEW61HA-105	E Cap		
C90	QFM31HK-103	MY Cap		
C91	QCF31HP-223	C Cap		
C92	QEW61CA-336	E Cap		
C93	QFM31HK-103	MY Cap		
C94	〃 -103	〃		
C95	〃 -103	〃		
C96	QCF31HP-223	C Cap		
C97	〃 -223	〃		
C98	〃 -223	〃		
C99	QEW61CA-476	E Cap		
C100	QCS31HJ-121	C Cap		
C101	〃 -390	〃		
C102	QCF31HP-223	〃		
C103	QCS31HJ-301	〃		
C104	QEW61HA-105	E Cap		
C105	〃 -105	〃		
C106	QFM31HK-272	MY Cap		
C107	QFM71HJ-102	〃		
C108	QFM31HK-102	〃		
C109	QEW61CA-476	E Cap		
C110	〃 -106	〃		
C111	QCF31HP-223	C Cap		
C201	QFM31HK-103	MY Cap		
C202	QEW61CA-106	E Cap		
C203	QFM31HK-333	MY Cap		
C204	〃 -103	〃		
C205	QCS31HJ-680	C Cap		
C206	QFM31HK-123	MY Cap		
C207	QCS31HJ-331	C Cap		
C208	QFM31HK-223	MY Cap		
C209	〃 -103	〃		
C210	QCS31HJ-151	C Cap		
C211	QEW61CA-476	E Cap		
C212	QFM31HK-333	MY Cap		
C213	QCF31HP-223	C Cap		
C214	QFM31HK-223	MY Cap		
C215	〃 -333	〃		
C216	〃 -103	〃		
C217	〃 -104	〃		
C218	QCF31HP-223	C Cap		
C219	QFM31HK-104	MY Cap		
C220	〃 -103	〃		
C221	QCS31HJ-101	C Cap		
C222	QEW61CA-106	E Cap		
C223	QCF31HP-223	C Cap		
C224	QEW61CA-106	E Cap		
C225	QFM31HK-333	MY Cap		
C226	QCF31HP-223	C Cap		
C227	QFM31HK-103	MY Cap		
C228	QEW61CA-106	E Cap		

Symbol No.	Part No.	Part Name	Description	Q'ty
C229	QCF31HP-223	C Cap		
C230	QFM31HK-103	MY Cap		
C231	QCS31HJ-560	C Cap		
C232	QFM31HK-103	MY Cap		
C233	QCS31HJ-331	C Cap		
C234	QEW61CA-106	E Cap		
C235	QFM31HK-102	MY Cap		
C236	″ -103	″		
C237	″ -103	″		
C238	QCF31HP-223	C Cap		
C239	QFM31HK-102	MY Cap		
C240	QEW61CA-336	E Cap		
C241	QFM31HK-103	MY Cap		
C242	″ -102	″		
C243	QEE41CM-336	T Cap		
C244	QFM31HK-102	MY Cap		
C245	QCF31HP-223	C Cap		
C246	QFM31HK-222	MY Cap		
C247	QCT05UJ-330	C Cap		
C248	—	—		
C249	QCT05UJ-390	C Cap		
C250	QFM31HK-222	MY Cap		
C251	QCT05UJ-150	C Cap		
C252	QCS31HJ-390	″		
C253	QFM31HK-104	MY Cap		
C254	QEW61CA-336	E Cap		
C255	—	—		
C256	QEE41CM-335	T Cap		
C257	QFM31HK-102	MY Cap		
C258	QEE41AM-476	T Cap		
C259	QEW61EA-335	E Cap		
C260	QFM31HK-102	MY Cap		
C261	QEW61CA-476	E Cap		
C262	QFM31HK-222	MY Cap		
C263	QCS31HJ-471	C Cap		
C264	QCF31HP-223	″		
C265	QCS31HJ-330	″		
C266	″ -331	″		
C267	″ -560	″		
C268	QFM31HK-103	MY Cap		
C269	QCS31HJ-331	C Cap		
C270	QFM31HK-102	MY Cap		
C271	QEE41EM-105	T Cap		
C272	QFM31HK-102	MY Cap		
C273	QEW61CA-106	E Cap		
C274	QEW61HA-105	″		
C275	QFM31HK-102	MY Cap		
C276	″ -223	″		
C277	″ -103	″		
C278	QFM71HJ-563	″		
C279	QEW60JA-336	E Cap		
C280	QCF31HP-223	C Cap		
C281	QEW61CA-476	E Cap		
C282	″ -476	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
C283	QFM31HK-103	MY Cap		
C284	QCS31HJ-101	C Cap		
C285	QFM31HK-103	MY Cap		
C286	QCS31HJ-101	C Cap		
C287	QEW61CA-336	E Cap		
C288	〃 -336	〃		
C289	QEW61EA-475	〃		
C290	QFM31HK-152	MY Cap		
C291	〃 -682	〃		
C292	QCF31HP-223	C Cap		
C293	QCT25CH-101	〃		
C294	QCT05UJ-100	〃		
C295	QAT3001-008	Trimmer Cap		
C296	QCS31HJ-181	C Cap		
C297	QCT05UJ-820	〃		
C298	QCF31HP-223	〃		
C299	QEW61CA-476	E Cap		
C300	QFM31HK-103	MY Cap		
C301	〃 -102	〃		
C302	〃 -102	〃		
C303	QCS31HJ-470	C Cap		
C304	〃 -330	〃		
C305	QFM31HK-102	MY Cap		
C306	QCF31HP-223	C Cap		
C307	QFM31HK-102	MY Cap		
C308	QCS31HJ-390	C Cap		
C309	〃 -390	〃		
C310	QEW61CA-107	E Cap		
C311	QCS31HJ-121	C Cap		
C312	〃 -391	〃		
C313	〃 -331	〃		
C314	QFM31HK-122	MY Cap		
C315	〃 -103	〃		
C316	〃 -103	〃		
C317	〃 -563	〃		
C318	〃 -103	〃		
C319	〃 -103	〃		
L 1	A040725-68	Peaking Coil		
L 2	PU46021-101	Choke Coil		
L 3	A040725-100	Peaking Coil		
L 4	〃 -56	〃		
L 5	〃 -18	〃		
L 6	〃 -100	〃		
L 7	〃 -33	〃		
L 8	〃 -47	〃		
L 9	〃 -56	〃		
L10	〃 -220	〃		
L11	〃 -8.2	〃		
L12	〃 -100	〃		
L13	〃 -18	〃		
L14	〃 -5.6	〃		
L15	〃 -1	〃		
L16	PU46021-101	Choke Coil		

Symbol No.	Part No.	Part Name	Description	Q'ty
L17	A04725-100	Peaking Coil		
L18	" -100	"		
L19	" -1200	"		
L20	" -100	"		
L21	" -47	"		
L22	" -100	"		
L201	PU47051-822	Coil		
L202	A04725-100	Peaking Coil		
L203	PU46003-3R9	"		
L204	A04725-100	"		
L205	PU46398-2	Coil		
L206	PU46003-6R8	Peaking Coil		
L207	PU46021-101	Choke Coil		
L208	A04725-39	Peaking Coil		
L209	PU46003-3R9	"		
L210	" -3R9	"		
L211	PU47051-822	Coil		
L212	PU46021-101	Choke Coil		
L213	PU47051-822	Coil		
L214	" -822	"		
RLC 1	PU46020-3	RLC Block		
LPF 1	PU30192-9D	Low Pass Filter		
LPF 2	PU31932-2	"		
LPF201	PU30192-1D	"		
BPF201	PU30190-6S	Band Pass Filter		
BPF202	" -6S	"		
BPF203	PU46041	"		
HPF 1	PU30487-4D	High Pass Filter		
DL 1	PU43627C	1-H Delay Line		
DL202	PU46321-3	2-H Delay Line		
DF 1	PU30773	Demod. Filter		
EQ 1	PU31933-3	Equalizer		
EQ 2	PU31933	"		
CF201	PU46521	Ceramic Filter		
CT201	PU46042	Ceramic Trap		
X'tal 201	PU46040	Crystal	(4.435571 MHz)	
X'tal 202	PU31449-2	"	(4.433619 MHz)	
	PU43351-3	Cap. Housing	(41–43) (81–83)	2
	" -3Y	"	(71–73)	1
	" -4	"	(31–34) (51–54) (61–64)	3
	" -5	"	(21–25)	1
	" -6	"	(11–16)	1

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU43092	Collar		8
	A74138-1	Test Pin		35
	PU46006	Shield Case		1
	PU47291	Shield Plate		1
	PU47332	Shield Case		1
	PU31302	PWB Bracket		1
	DPSP3006ZS	Screw		3
	NNS3000NS	Nut		2
	PU42697H	FM Mod. Unit	REF: $\boxed{1}\boxed{4}$	1
	DPSP3006ZS	Screw	For Setting PWB Ass'y	2

11.2.4 PRE & REC PWB ASS'Y 0 5 PU46016C

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	6A753	Integrated Circuit		
IC 2	"	"		
IC 3	18V103	"		
X 1	2SC829C	Transistor		
X 2	"	"		
X 3	2SA564Q	"		
X 4	2SA719R	"		
X 5	2SC1317R	"		
X 6	"	"		
X 7	2SA719R	"		
X 8	2SC1317R	"		
X 9	"	"		
X10	2SC828Q	"		
X11	"	"		
X12	2SC829C	"		
X13	"	"		
X14	2SC1317R	"		
X15	2SA564Q	"		
D 1	OA91	Diode		
D 2	MA150LF	"		
D 3	"	"		
R 1	QVP4A0B-102	VR		
R 2	" -102	"		
R 3	QRD181J-103	CR		
R 4	" -222	"		
R 5	" -222	"		
R 6	" -682	"		
R 7	" -154	"		
R 8	" -273	"		
R 9	" -822	"		
R10	" -561	"		
R11	" -220	"		
R12	" -102	"		
R13	" -102	"		
R14	" -562	"		
R15	" -562	"		
R16	" -102	"		
R17	QRX126J-100	MFR		
R18	QRD181J-100	CR		
R19	" -682	"		
R20	" -4R7	"		
R21	" -4R7	"		
R22	" -562	"		
R23	" -180	"		
R24	QVP4A0B-101	VR		
R25	QRD181J-330	CR		
R26	" -272	"		
R27	" -272	"		
R28	" -3R9	"		
R29	" -3R9	"		
R30	" -272	"		
R31	" -272	"		

Symbol No.	Part No.	Part Name	Description	Q'ty
R32	QRD181J-391	CR		
R33	QVP4A0B-103	VR		
R34	″ -103	″		
R35	QRD181J-391	CR		
R36	″ -561	″		
R37	″ -561	″		
R38	″ -273	″		
R39	″ -472	″		
R40	″ -472	″		
R41	″ -273	″		
R42	″ -102	″		
R43	″ -151	″		
R44	″ -151	″		
R45	″ -102	″		
R46	″ -472	″		
R47	″ -472	″		
R48	QVP4A0B-222	VR		
R49	″ -222	″		
R50	QRD181J-221	CR		
R51	″ -182	″		
R52	QVP4A0B-222	VR		
R53	QRD181J-221	CR		
R54	″ -272	″		
R55	QVP4A0B-222	VR		
R56	QRD181J-221	CR		
R57	–	–		
R58	QRD143K-103	CR		
C 1	QCF31HP-223	C Cap		
C 2	QEW61CA-476	E Cap		
C 3	QFM31HK-223	MY Cap		
C 4	QEW60JA-227	E Cap		
C 5	QFM31HK-223	MY Cap		
C 6	″ -333	″		
C 7	″ -333	″		
C 8	QCS31HJ-100	C Cap		
C 9	QFM31HK-392	MY Cap		
C10	QEE51CM-106	T Cap		
C11	″ -106	″		
C12	QCF31HP-223	C Cap		
C13	″ -223	″		
C14	″ -223	″		
C15	″ -223	″		
C16	–	–		
C17	–	–		
C18	QAT3001-009	Trimmer Cap		
C19	″ -009	″		
C20	QEW61CA-336	E Cap		
C21	QCF31HP-223	C Cap		
C22	″ -223	″		
C23	″ -223	″		
C24	QEW61CA-336	E Cap		
C25	QCF31HP-223	C Cap		
C26	″ -223	″		
C27	″ -223	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
C28	QCF31HP-223	C Cap		
C29	QCS31HJ-151	″		
C30	QCF31HP-223	″		
C31	QCS31HJ-151	″		
C32	QCF31HP-223	″		
C33	″ -223	″		
C34	QEW61CA-336	E Cap		
C35	QCS31HJ-221	C Cap		
C36	QEW61CA-336	E Cap		
C37	QFM31HK-223	MY Cap		
C38	″ -223	″		
C39	″ -562	″		
C40	″ -102	″		
C41	″ -223	″		
C42	″ -103	″		
C43	QCS31HJ-221	C Cap		
C44	QFM31HK-102	MY Cap		
C45	QCS31HJ-330	C Cap		
C46	QEW61CA-336	E Cap		
C47	QFM31HK-223	MY Cap		
C48	QCF31HP-223	C Cap		
C49	QFM31HK-102	MY Cap		
C50	QCS31HJ-180	C Cap		
C51	QFM41HK-123	MY Cap		
L 1	A04725-56	Peaking Coil		
L 2	″ -100	″		
L 3	″ -47	″		
L 4	″ -47	″		
L 5	″ -100	″		
L 6	″ -820	″		
L 7	″ -39	″		
L 8	″ -82	″		
L 9	A04096-8200	″		
LPF1	PU30192-1D	LPF		
	PU43351-3	Cap. Housing	(61–63)	1
	″ -4	″	(21–24)	1
	″ -5	″	(11–15)	1
	″ -6	″	(31–36)	1
	PU46013	Shield Case (1)		1
	PU46014	″ (2)		1
	PU46015	″ (3)		1
	PU43092	Collar	For R17,20,21	6
	A74138	Pin		7
	DPSP3008ZS	Screw	For Setting PWB Ass'y	4

11.2.5 AUDIO & SERVO PWB ASS'Y 0 6 PU46774B

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	AN301	Integrated Circuit		
IC 2	AN318	"		
IC 3	UPD4011C	"		
IC 4	MSM5816	"		
IC 5	UPC1458C	"		
IC 6	AN262	"		
X 1	–	–		
X 2	–	–		
X 3	2SC828Q	Transistor		
X 4	"	"		
X 5	"	"		
X 6	"	"		
X 7	2SA564Q	"		
X 8	2SK40C	F.E.Transistor		
X 9	2SC829C	Transistor		
X10	"	"		
X11	"	"		
X12	"	"		
X13	"	"		
X14	"	"		
X15	2SC1162WTC	"		
X16	"	"		
D 1	MA150LF	Diode		
D 2	"	"		
D 3	"	"		
D 4	"	"		
D 5	"	"		
D 6	"	"		
D 7	"	"		
D 8	"	"		
D 9	"	"		
D10	"	"		
D11	"	"		
D12	"	"		
D13	"	"		
D14	"	"		
D15	"	"		
D16	RD3.9EC	Zener Diode		
D17	MA150LF	Diode		
D18	MA150	"		
D19	MA150LF	"		
D20	"	"		
D21	–	–		
D22	MA150LF	Diode		
D23	"	"		
R 1	QRD187K-472	CR		
R 2	" -103	"		
R 3	" -103	"		
R 4	" -103	"		
R 5	" -102	"		
R 6	" -474	"		

Symbol No.	Part No.	Part Name	Description	Q'ty
R 7	QRD187K-272	CR		
R 8	QVP4A0B-473	VR		
R 9	QRD187K-154	CR		
R10	QVP4A0B-224	VR		
R11	QRD187K-154	CR		
R12	″ -220	″		
R13	″ -222	″		
R14	″ -472	″		
R15	″ -222	″		
R16	″ -223	″		
R17	″ -473	″		
R18	″ -223	″		
R19	″ -272	″		
R20	″ -123	″		
R21	QVP4A0B-473	VR		
R22	QRD187K-123	CR		
R23	QVP4A0B-472	VR		
R24	″ -473	″		
R25	QRD187K-333	CR		
R26	″ -333	″		
R27	″ -103	″		
R28	″ -223	″		
R29	″ -563	″		
R30	″ -563	″		
R31	″ -103	″		
R32	″ -153	″		
R33	TD5-C220	Thermistor		
R34	QRC141K-825	COM R		
R35	QRD187K-223	CR		
R36	″ -223	″		
R37	″ -333	″		
R38	″ -153	″		
R39	″ -274	″		
R40	″ -473	″		
R41	″ -184	″		
R42	″ -475	″		
R43	″ -683	″		
R44	″ -105	″		
R45	″ -183	″		
R46	″ -103	″		
R47	″ -472	″		
R48	″ -103	″		
R49	QVP4A0B-222	VR		
R50	QRD187K-223	CR		
R51	″ -472	″		
R52	QVP4A0B-473	VR		
R53	QRD187K-821	CR		
R54	—	—		
R55	QRD187K-103	CR		
R56	″ -103	″		
R57	″ -104	″		
R58	″ -221	″		
R59	″ -395	″		
R60	″ -225	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
R61	QRD187K-105	CR		
R62	″ -225	″		
R63	″ -104	″		
R64	″ -474	″		
R65	″ -472	″		
R66	QVP4A0B-103	VR		
R67	QRD187K-472	CR		
R68	″ -103	″		
R69	″ -223	″		
R70	″ -223	″		
R71	″ -103	″		
R72	″ -472	″		
R73	″ -224	″		
R74	″ -103	″		
R75	″ -472	″		
R76	″ -224	″		
R77	″ -103	″		
R78	″ -222	″		
R79	″ -393	″		
R80	PU44626	R		
R81	QRW125J-R47	WR		
R82	–	–		
R83	–	–		
R84	–	–		
R85	–	–		
R86	–	–		
R87	–	–		
R88	–	–		
R89	–	–		
R90	–	–		
R91	–	–		
R92	–	–		
R93	–	–		
R94	–	–		
R95	–	–		
R96	–	–		
R97	–	–		
R98	–	–		
R99	–	–		
R100	–	–		
R101	QRD187K-473	CR		
R102	QVP4A0B-223	VR		
R103	QRD187K-122	CR		
R104	QRD121K-271	″		
R105	QRD187K-104	″		
R106	″ -334	″		
R107	″ -103	″		
R108	″ -471	″		
R109	″ -223	″		
R110	″ -103	″		
R111	″ -183	″		
R112	–	–		
R113	QRD187K-103	CR		
R114	″ -272	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
R115	QRD187K-333	CR		
R116	〃 -223	〃		
R117	QVP4A0B-223	VR		
R118	QRD187K-682	CR		
R119	〃 -152	〃		
R120	〃 -221	〃		
R121	〃 -103	〃		
R122	〃 -102	〃		
R123	〃 -223	〃		
R124	〃 -222	〃		
R125	〃 -103	〃		
R126	QVP4A0B-682	VR		
R127	QRD187K-152	CR		
R128	QVP4A0B-103	VR		
R129	QRD187K-223	CR		
R130	〃 -102	〃		
R131	〃 -101	〃		
R132	〃 -223	〃		
R133	〃 -125	〃		
R134	〃 -155	〃		
R135	QRX126J-5R6	MF R		
R136	QRD187K-682	CR		
R137	〃 -473	〃		
R138	〃 -223	〃		
R139	〃 -103	〃		
R140	〃 -102	〃		
R141	〃 -222	〃		
R142	QRG126J-150	OMF R		
R143	〃 -150	〃		
R144	QVP4A0B-683	VR		
R145	QRD187K-102	CR		
R146	QRD183K-223	〃		
C 1	QFZ0021-102	MY Cap		
C 2	〃 -102	〃		
C 3	〃 -102	〃		
C 4	QCS31HJ-680	C Cap		
C 5	〃 -471	〃		
C 6	QEW61AA-476	E Cap		
C 7	QEW61HA-105	〃		
C 8	QCS31HJ-101	C Cap		
C 9	QEW61HA-474	E Cap		
C10	QEW61CA-476	〃		
C11	QFZ0021-123	MY Cap		
C12	〃 -104	〃		
C13	〃 -124	〃		
C14	〃 -102	〃		
C15	〃 -102	〃		
C16	QEW61CA-106	E Cap		
C17	QEW60JA-227	〃		
C18	QFZ0021-222	MY Cap		
C19	〃 -103	〃		
C20	〃 -103	〃		
C21	QEW61CA-476	E Cap		
C22	〃 -476	〃		

Symbol No.	Part No.	Part Name	Description	Q'ty
C23	QEW61CA-106	E Cap		
C24	QFZ0021-103	MY Cap		
C25	" -563	"		
C26	" -103	"		
C27	" -563	"		
C28	" -124	"		
C29	" -102	"		
C30	" -273	"		
C31	" -393	"		
C32	" -224	"		
C33	QEE41CM-106	T Cap		
C34	QEW61HA-105	E Cap		
C35	QEW61CA-476	"		
C36	QCF11HP-473	C Cap		
C37	QEW61EA-475	E Cap		
C38	QFZ0021-124	MY Cap		
C39	" -103	"		
C40	" -103	"		
C41	QEE41CM-475	T Cap		
C42	QEN41HA-105	NP Cap		
C43	QFZ0021-104	MY Cap		
C44	" -223	"		
C45	QEW61CA-106	E Cap		
C46	" -106	"		
C47	" -106	"		
C48	" -106	"		
C49	QFZ0021-102	MY Cap		
C50	QEW61CA-106	E Cap		
C51	QFZ0021-822	MY Cap		
C52	QEW61AA-476	E Cap		
C53	QFZ0021-102	MY Cap		
C54	QEW61CA-107	E Cap		
C55	QCS31HJ-561	C Cap		
C56	QFZ0021-683	MY Cap		
C57	QEW61CA-106	E Cap		
C58	" -106	"		
C59	QEW61HA-105	"		
C60	QEW61CA-106	"		
C61	" -227	"		
C62	" -476	"		
C63	" -106	"		
C64	QEW61HA-105	"		
C65	" -474	"		
C66	QCS31HJ-391	C Cap		
C67	QEW61HA-105	E Cap		
C68	QCS31HJ-681	C Cap		
C69	QEW61HA-105	E Cap		
C70	" -105	"		
C71	QFZ0021-473	MY Cap		
C72	" -104	"		
C73	QEW61AA-476	E Cap		
C74	QEW61EA-475	"		
C75	QFZ0021-102	MY Cap		
C76	QEW61CA-107	E Cap		

Symbol No.	Part No.	Part Name	Description	Q'ty
C77	QEW61CA-476	E Cap		
C78	QEN41CA-475	NP Cap		
C79	QEW61CA-107	E Cap		
C80	QFZ0021-103	MY Cap		
C81	" -103	"		
C82	" -103	"		
C83	QCS31HJ-561	C Cap		
C84	QFP32XK-272	PP Cap		
C85	" -392	"		
C86	QFZ0021-103			
L 1	A04725-330	Peaking Coil		
L 2	PU30771-5	Coil		
L 3	A04725-2700	Peaking Coil		
OS 1	PU46776C	Ceramic Osc.		
T 1	PU30961	Osc. Transformer		
S 1	PU47001	Slide Switch		
S 2	PU47002	"		
	QLP3104-107B	Lamp	(Recording Lamp)	1
	PU43351-3	Cap. Housing	(21–23) (31–33) (61–63) (71–73) (81–83) (131–133)	6
	PU43351-3R	"	(91–93) (101–103)	2
	" -6	"	(11–16)	1
	" -7	"	(141–147)	1
	" -9	"	(151–159)	1
	" -106	"	(111–116)	1
	" -3Y	"	(41–43) (51–53)	2
	PU43092	Collar		8
	A74138-1	Test Pin		21
	DPSP3008ZS	Screw	For Setting PWB Ass'y	2

11.2.6 JUNCTION PWB ASS'Y 0 7

Symbol No.	Part No.	Part Name	Description	Q'ty
X 1	2SC829C	Transistor		
D 1	VO3C	Diode		
D 2	"	"		
D 3	MA150LF	"		
D 4	"	"		
D 7	MA150	"		
R 1	QRG016J-151	OMF R		
R 2	QRD142K-123	CR		
R 3	" -182	"		
R 4	" -102	"		
R 5	QRG016J-680	OMF R		
R 6	QRD142K-102	CR		
R 7	" -184	"		
R 8	PU45352	Thermistor		
R 9	QRD142K-273	CR		
R10	" -184	"		
R11	PU45352	Thermistor		
R12	QRD142K-273	CR		
R13	–	–		
R14	QRD143K-822	CR		
R15	QRD142K-102	"		
R16	QRG016J-151	OMF R		
R17	QRD181J-102	CR		
C 1	QEW21EA-228	E Cap		
C 2	QEW41CA-476	"		
C 3	QET21HR-474	"		
	PU43351-103	Cap. Housing	(61–63)	1
	" -104	"	(51–54)	1
	" -6	"	(71–76)	1
	A75802-5	"	(1–R)	1
	PU43092	Collar		6
	A74138-1	Pin		1
	A74017	Tab		4
	A49796	Pin		1
	PU45908-2	Test Pin	(V. OUT)	1

11.2.7 MECHACON PWB ASS'Y $\boxed{0}\boxed{8}$ PU47405A

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	MSM5830RS	Integrated Circuit		
X 1	–	–		
X 2	–	–		
X 3	2SD636R	Transistor		
X 4	″	″		
X 5	2SD639S	″		
X 6	2SC1162WTC	″		
X 7	2SD636R	″		
X 8	2SD639S	″		
X 9	2SC1162WTC	″		
X10	2SD671T	″		
X11	2SD636R	″		
D 1	1S2473HJ	Diode		
D 2	″	″		
D 3	″	″		
D 4	″	″		
D 5	″	″		
D 6	″	″		
D 7	1S2473	″		
R 1	QRD187J-153	CR		
R 2	″ -153	″		
R 3	″ -105	″		
R 4	″ -331	″		
R 5	″ -104	″		
R 6	″ -223	″		
R 7	–	–		
R 8	QRD187J-472	CR		
R 9	″ -822	″		
R10	″ -822	″		
R11	″ -223	″		
R12	″ -222	″		
R13	″ -562	″		
R14	″ -103	″		
R15	″ -223	″		
R16	″ -223	″		
R17	″ -154	″		
R18	–	–		
R19	QRD187J-102	CR		
R20	″ -682	″		
R21	″ -273	″		
R22	″ -562	″		
R23	″ -333	″		
R24	″ -103	″		
R25	″ -105	″		
R26	″ -221	″		
R27	″ -562	″		
R28	″ -102	″		
R29	″ -475	″		
R30	″ -182	″		
C 1	QFM31HK-473	MY Cap		

Symbol No.	Part No.	Part Name	Description	Q'ty
C 2	QET61CR-106	E Cap		
C 3	QFM71HJ-333	MY Cap		
C 4	QET61HR-335	E Cap		
C 5	QFM31HK-103	MY Cap		
C 6	QET61HR-335	E Cap		
C 7	QET61CR-336	"		
C 8	QFM31HK-103	MY Cap		
C 9	QET61CR-476	E Cap		
C10	" -106	"		
C11	QET61HR-335	"		
C12	QET61CR-336	"		
	PU43351-3R	Cap. Housing	(61–63), (161–163)	2
	" -3	"	(31–33), (41–43)	2
	" -6	"	(11–16)	1
	" -10	"	(21–30)	1
	DPSP3008ZS	Screw	For Setting PWB Ass'y	2

11.2.8 OPERATION PWB ASS'Y 0 9

Symbol No.	Part No.	Part Name	Description	Q'ty
	QSM1S01-014	Microswitch		5
	PU31277	Operation P.W.B.		1

11.2.9 FUNCTION PWB ASS'Y 1 0

Symbol No.	Part No.	Part Name	Description	Q'ty
	AX49327	Lever SW Ass'y		
	A19086-B1	P. SW P.W.B.		
	QLP3104-107B	Lamp	Power Lamp	

11.2.10 INPUT SELECT SW PWB ASS'Y 1 1

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44611	Lever SW Ass'y		
	PU44660	I. SW P.W.B.		
RFC-1	QQL043K-101	Peaking Coil		

11.2.11 FM MOD UNIT PWB ASS'Y [1][4] PU42697H

Symbol No.	Part No.	Part Name	Description	Q'ty
X 1	2N2369	Transistor	Note: As FM Mod. Unit Ass'y is completely adjusted at our factory, please change them by unit ass'y in case of repair.	
X 2	"	"		
T 1	PU30769	FM Mod. Trans.		
R 1	QVP4A0B-102	VR		
R 2	QRD143K-182	CR		
R 3	" -182	"		
R 4	" -151	"		
R 5	" -331	"		
R 6	" -682	"		
R 7	" -682	"		
R 8	" -331	"		
R 9	" -181	"		
C 1	PU30767-220	Feed Through Cap		
C 2	QCT05CH-470	C Cap		
C 3	" -390	"		
C 4	QAT3001-015	Trimmer Cap		
C 5	PU30767-102	Feed Through Cap		
C 6	QEW41HA-105	E Cap		
C 7	PU30767-220	Feed Through Cap		
L 1	A04096-100	Peaking Coil		
	PU42674	Shield Case		1
	PU42675-2	"		1
	PU42675-3	"		1
	PU42696A	S. Case Cover Ass'y		1

11.2.12 HEATER PWB ASS'Y [1][5]

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44689	Heater P.W.B.		1
	PU44624	T. Lead SWitch		1
	A74138	Pin		6

11.2.13 A.E. &A/CTL HEAD PWB ASS'Y [1][6]

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU46436	Head P.W.B.	PU44681 is misprint.	1

11.2.14 FULL FRASE HEAD PWB ASS'Y [1][7]

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44742	F.E.H. P.W.B.		1

11.2.15 START SENSER PWB ASS'Y $\boxed{1}\boxed{9}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU46394	Supply Photo Transistor Board		1
	PN202S	Photo Transistor		1
	PU46395	Shade		1

11.2.16 END SENSER PWB ASS'Y $\boxed{2}\boxed{0}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44679	T.U. Photo Transistor P.W.B.		1
	PN202S	Photo Transistor		1
	PU44897	Shade		1

11.2.17 FULL SNSER & SEARCH PWB ASS'Y $\boxed{2}\boxed{1}$

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	DN835	Hall I.C.		
D 1	RD5.1E	Zener Diode		
R 1	QRD122K-331	CR		
R 2	QRD142K-471	"		
C 1	QCF31HP-103	C Cap		
	PU44666	T.U. Sens. P.W.B.		1
	PU43802	IC Clamp		1

11.2.18 POWER TR P.W.B. (REGULATOR) $\boxed{2}\boxed{2}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44741	Power Transistor P.W.B.		1
X 1	2SD3890	Transistor		
X 2	"	"		
	(PU45375-1)	Spacer	] included 2SD3890	2
	(PU41624-6)	Insulator		2
	LPSP3008ZS			1

11.2.19 POWER TR P.W.B. (A/S) $\boxed{2}\boxed{3}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44741	Power Transistor P.W.B.		1
X 1	2SD3890	Transistor		
X 2	"	"		
	(PU45375-1)	Spacer	] included 2SD3890	2
	(PU41624-6)	Insulator		2
	LPSP3008ZS	Screw		1

11.2.20 TERMINAL PWB (VIDEO HEAD) ASS'Y $\boxed{2}\boxed{4}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44674	Terminal P.W.B.		1

11.2.21 TIMER PWB ASS'Y $\boxed{2}\boxed{5}$

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	SC3044	LSI		1
LED 1	PU47057	LED Display		1
X 1	2SC2021R (or S)	Transistor		
X 2	2SA786Q (or R)	"		
X 3	2SC1384S	"		
X 4	2SC2021R (or S)	"		
X 5	"	"		
D 1	AU01-07	Zener Diode		
D 2	"	"		
D 3	VO3C	Diode		
D 4	"	"		
D 5	RD6.2EB	Zener Diode		
D 6	1S2473VE	Diode		
D 7	"	"		
D 8	"	"		
D 9	1S2473	"		
D10	"	"		
R 1	–	–		
R 2	–	–		
R 3	QRD143K-471	CR		
R 4	QRD183J-103	"		
R 5	" -103	"		
R 6	" -103	"		
R 7	" -103	"		
R 8	" -392	"		
R 9	" -473	"		
R10	" -473	"		
RA 1	PU47058	Resistor Array		1
C 1	QEW61CA-106	E Cap		
C 2	QFM41HK-103	MY Cap		
C 3	QEE41AM-226	T Cap		
C 4	QEE41EM-105	"		
	PU43351-6	Cap. Housing		1
	PU45380-3	"		1
	GK-35050	C. Mark		4
	PU47037	Test Pin		
	PU47462	IC Socket		1
	PU47034	Push Switch	S1–S6	6

11.2.22 CH SELECTOR PWB ASS'Y [2] [7] VH8001B2

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 91	UPC574J	Integrated Circuit		
X21	2SA673C	Transistor		
X22	2SC458C	"		
X23	"	"		
X24	"	"		
D 1	GL-3PG2	L.E.D.		
D 2	"	"		
D 3	"	"		
D 4	"	"		
D 5	"	"		
D 6	"	"		
D 7	"	"		
D 8	"	"		
D11–18	1S2473H	Diode		8
D21–25	"	"		5
R 1	QRD142K-152	CR		
R 2	" -152	"		
R 3	" -152	"		
R 4	" -152	"		
R 5	" -152	"		
R 6	" -152	"		
R 7	" -152	"		
R 8	" -152	"		
R21	" -563	"		
R22	" -562	"		
R23	" -473	"		
R24	" -223	"		
R25	" -273	"		
R26	" -104	"		
R27	" -104	"		
R91	AX49296-1.5	OMR		
C 1	QEW61HA-474	E Cap		
S 1	QSP0280-001	Push Lock SW	(S1–S8)	8
	A75761	Heat Sink		1
	PU43351-3	Cap. Housing		1
	" -4	"		4
	" -5	"		1

11.2.23 PRE SETTER PWB ASS'Y $\boxed{2}\boxed{8}$ VH8501A

Symbol No.	Part No.	Part Name	Description	Q'ty
	AA07A402	P.M. Block Ass'y		1
S51	QSM1S01-014	Micro SW.		1
	C39002-A1	P.W. Board		1

11.2.24 TERMINAL PWB ASS'Y (TUNER) $\boxed{2}\boxed{9}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	A75397-B1	Terminal P.W.B.		1
C 1	QEW61HA-105	E Cap		
C 2	QEW61CA-106	"		
C 5	" -106	"		1
C 6	" -106	"		1
C 7	" -476	"		1
	A75514-1	Lavel		1

11.2.25 MODE SELECT PWB ASS'Y $\boxed{3}\boxed{0}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	A75980-B5	Mode Select P.W.B.		1
	QRD142J-681	CR		1

11.3 ELECTRICAL PARTS LIST BY ASSEMBLIES FOR HR-3330EK

11.3.1 REGULATOR PWB ASS'Y 0 2 PU47178B

Symbol No.	Part No.	Part Name		Q'ty
X 1	2SC1213AD	Transistor		
X 2	2SC828Q	"		
D 1	S4VB10	Diode Stack		
D 2	VO3C	Diode		
D 3	RD6.8EC	Zener Diode		
D 4	S2VB10	Diode Stack		
D 5	–	–		
D 6	AU01-12	Zener Diode		
R 1	QRD143K-121	CR		
R 2	QRG016J-121	OMR		
R 3	QRD143K-222	CR		
R 4	" -222	"		
R 5	QRW125J-R47	WR		
R 6	" -R47	"		
R 7	" -R47	"		
R 8	" -R47	"		
R 9	QRD143K-821	CR		
R10	" -102	"		
R11	QVP4A0B-102	VR		
R12	QRD143K-222	CR		
R13	QRD122J-271	"		
R14	" -123	"		
R15	QRD143K-562	"		
R16	–	–		
R17	QRG026J-101	OMR		
R18	" -470	"		
R19	" -470	"		
R20	QRD142J-820	"		
C 1	QFM71HK-154	M Cap		
C 2	QCF32HP-103	C Cap		
C 3	QFZ0021-104	M Cap		
C 4	QEW71VH-338	E Cap		
C 5	QEW61EA-107	"		
C 6	QEW61AA-336	"		
C 7	QFZ0021-103	M Cap		
C 8	QEW61CA-476	E Cap		
C 9	" -107	"		
C10	QFZ0021-104	M Cap		
C11	QCF32HP-103	C Cap		
C12	QEW51JA-227	E Cap		
C13	QCF32HP-103	C Cap		
C14	" -103	"		
C15	QCF31HP-103	"		
C16	" -103	"		
F 1	QMF51A2-3R15	Fuse		
F 2	" -R50	"		
	A44594-001	Fuse Clip		4
RY1	PU44991	Relay		

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU43351-3	Cap Housing		4
	" -4	"		2
	PU43351-5	Cap Housing		1
	" -6	"		1
	A75802-4	Connector Base		1
	" -5	"		1
	A49796	Tab		2
	GK35050	Caution Mark		–
	PU43092	Spacer		14
	PU44682	Heat Sink		1
	LPSP3014ZS	Screw	For Heat Sink	1
	WNS3000NS	Washer		1
	NNB3000NS	Nut		1

11.3.2 TUNER PWB ASS'Y 0 3 VH1002A

Symbol No.	Part No.	Part Name	Description	Q'ty
IC101	AN345V	Integrated Circuit		
IC401	AN321	″		
IC501	HA11107	″	or HA1154	
X101	2SC1686V	Transistor		
X102	″	″		
X103	2SC1360	″		
X201	2SC1213A	″		
D201	1S2076	Diode		
R101	QRD141K-821	CR		
R102	″ -181	″		
R103	″ -102	″		
R104	″ -561	″		
R105	″ -331	″		
R106	″ -560	″		
R107	″ -221	″		
R108	″ -272	″		
R109	″ -122	″		
R110	QRG129J-560	OMR		
R111	QRD141K-102	CR		
R112	″ -472	″		
R113	″ -221	″		
R114	″ -121	″		
R115	″ -222	″		
R116	″ -102	″		
R117	″ -821	″		
R118	″ -152	″		
R201	QRD141K-331	CR		
R202	″ -561	″		
R203	″ -221	″		
R204	QVZ3230-023	VR		
R205	QRD141K-102	CR		
R206	QVZ3230-053	VR		
R207	—	—		
R208	QRD141K-103	CR		
R209	QVZ3230-014	VR		
R210	QRD141K-472	CR		
R211	″ -122	″		
R212	″ -103	″		
R213	″ -153	″		
R214	″ -681	″		
R215	—	—		
R216	QRG019J-101	OMR		
R217	QRD141K-222	CR		
R218	″ -392	″		
R219	″ -105	″		
R220	″ -562	″		
R401	QRG129J-680	OMR		
R402	QRD141K-103	CR		
R403	″ -563	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
R404	QRD141K-683	CR		
R501	QRD141K-392	CR		
R502	" -124	"		
R503	" -152	"		
R504	QRG129J-390	OMR		
R505	QVZ3230-023	VR		
R506	QRD141K-222	CR		
R507	" -473	"		
C101	QAT3001-010	Trimmer Cap		
C102	QCS31HJ-270	C Cap		
C103	–	–		
C104	QCT25HH-470	C Cap		
C105	QCT25LH-680	"		
C106	QCF31EZ-202	"		
C107	QFM71HK-273	M Cap		
C108	QCF31EZ-202	C Cap		
C109	" -202	"		
C110	QCS31HJ-9R0	"		
C111	QCF31EZ-202	"		
C112	QCS31HJ-6R0	"		
C113	–	–		
C114	QCF31HP-502	C Cap		
C115	QCS31HJ-470	"		
C116	QAT3001-010	Trimmer Cap		
C117	–	–		
C118	QCS31HJ-200	C Cap		
C119	QCT25LH-680	"		
C120	QCF31EZ-202	"		
C121	QCS31HJ-100	"		
C122	" -5R0	"		
C123	QCT25RH-101	"		
C124	QCF31HP-502	"		
C125	–	–		
C126	QCS31HJ-101	C Cap		
C127	QEW51CA-106	E Cap		
C128	QCF31EZ-202	C Cap		
C129	" -202	"		
C130	" -202	"		
C131	QEW61CA-476	E Cap		
C132	QEW51HA-105	"		
C133	QCS31HJ-9R0	C Cap		
C134	" -1R0	"		
C201	QEW61EA-335	E Cap		
C202	QEE50JM-686	T Cap		
C203	QEW61HA-105	E Cap		
C204	–	–		
C205	QCS31HJ-470	C Cap		
C206	" -100	"		
C207	QEW61CA-476	E Cap		
C208	" -476	"		
C209	QEW51CA-227	"		
C210	QFM71HK-682	MY Cap		
C211	QCS31HJ-100	C Cap		

Symbol No.	Part No.	Part Name	Description	Q'ty
C212	QCS31HJ-270	C Cap		
C213	QEW61CA-106	E Cap		
C214	QEW51CA-106	″		
C215	QCS31HJ-100	C Cap		
C401	QCS31HJ-3R0	C Cap		
C402	″ -470	″		
C403	QCF31EZ-202	″		
C404	QCF31HP-502	″		
C405	QCF31EZ-202	″		
C406	″ -202	″		
C407	–	–		
C408	QCF31HJ-470	C Cap		
C409	QCT25LH-101	″		
C410	–	–		
C411	QCF31EZ-202	C Cap		
C412	″ -202	″		
C413	″ -202	″		
C414	″ -202	″		
C501	QCS31HJ-4R0	C Cap		
C502	″ -100	″		
C503	″ -220	″		
C504	QFM71HK-683	MY Cap		
C505	QEW51CA-476	E Cap		
C506	–	–		
C507	QFM71HK-332	MY Cap		
C508	QCT25CH-150	C Cap		
C509	QEW61HA-105	″		
C510	QCF31EZ-202	″		
L101	A74979-R91	Peaking Coil		
L102	″ -R91	″		
L103	A04725-8.2	″		
L104	″ -1.8	″		
L105	″ -2.2	″		
L201	A04725-47	Peaking Coil		
L401	A04725-1.8	Peaking Coil		
L402	″ -1.8	″		
L403	″ -2.2	″		
L501	A04725-12	Peaking Coil		
L502	″ -6.8	″		
L503	″ -1.8	″		
L504	–	–		
L505	A04725-5.6	Peaking Coil		
T101	A75217	Coupling Trans.		
T102	A75152	Adj. S. Trap Trans.		
T103	A74657	S. Trap Trans.		
T104	A75084	3rd PIF Trans.		
T105	A75085	Def. Trans.		
T106	A75086	S. Trap Trans.		

Symbol No.	Part No.	Part Name	Description	Q'ty
T107	A74762	4.5 Trap Trans.		
T401	A75310	M. Coil		
T402	A75291	AFC Trans.		
T502	A75072	S. IF Trans.		
CF501	A75111	Ceramic Filter		
CR101	A75205-221	CR Block		
CR102	" -221	"		
CR103	" -221	"		
DM101	A75116	Det. Module		
DM501	A74664-C	"		
RFC1	QQL043K-101	Peaking Coil		
	A74138-2	Tab		10
	PU43351-3	Cap. Housing		1
	" -4	"		1
	" -6	"		1
	PU44816	Rod Holder		1
	C40189	Shield Case		1
	C40190	Shield Bridge L.		1
	C40191-2	Shield Top L.		1
	C40192	Shield Bottom L.		1
	C40193	Shield Case L.		1
	C40194	Shield Bridge S.		1
	C40195-2	Shield Top S.		1
	C40196	Shield Bottom S.		1
	A75375	Name Label		1

11.3.3 Y & COLOUR PWB ASS'Y 0 4 PU47178B

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	AN302	Integrated Circuit		
IC 2	12V104	"		
IC 3	VC2019	"		
IC 4	AN316	"		
IC 5	AN303	"		
IC 6	8V301	"		
IC 7	SN76670N	"		
IC 8	9V107	"		
IC 9	VC2011M	"		
IC10	SN76670N	"		
IC11	MSM4069	"		
IC201	VC2011M	Integrated Circuit		
IC202	AN305	"		
IC203	AN608	"		
IC204	AN236	"		
IC205	μPC741C	"		
IC206	"	"		
IC207	MN6061A	"		
IC208	AN337	"		
X 1	2SC2063Q	Transistor		
X 2	"	"		
X 3	"	"		
X 4	2SK40C	F.E. Transistor		
X 5	2SC2063Q	Transistor		
X 6	"	"		
X 7	"	"		
X 8	"	"		
X 9	"	"		
X201	2SK40C	F.E. Transistor		
X202	2SC2063Q	Transistor		
X203	"	"		
X204	"	"		
X205	"	"		
X206	2SA786Q	"		
X207	"	"		
X208	2SB643R	"		
X209	2SC2063Q	"		
X210	"	"		
X211	"	"		
X212	2SB643R	"		
X213	—	—		
X214	—	—		
X215	—	—		
X216	2SC2063Q	Transistor		
X217	2SA786Q	"		
X218	2SC2063Q	"		
X219	"	"		
X220	2SB643R	"		
D 1	OA90	Diode		
D 2	1S2473HJ	"		
D 3	MA150	"		
D 4	"	"		
D 5	OA90	"		

Symbol No.	Part No.	Part Name	Description	Q'ty
D 6	OA90	Diode		
D 7	"	"		
D 8	"	"		
D 9	"	"		
D10	1S2473HJ	"		
D11	"	"		
D12	OA91	"		
D13	1S2473HJ	"		
D14	"	"		
D15	"	"		
D16	"	"		
D17	"	"		
D18	"	"		
D19	"	"		
D20	"	"		
D201	1S2473HJ	Diode		
D202	"	"		
D203	MA150	"		
D204	"	"		
D205	–	–		
D206	MA150	Diode		
D207	"	"		
D208	1S2473HJ	"		
D209	"	"		
D210	"	"		
D211	"	"		
D212	"	"		
D213	"	"		
D214	–	–		
D215	–	–		
D216	–	–		
D217	1S2473HJ	Diode		
D218	"	"		
D219	"	"		
D220	"	"		
R 1	QRD187J-750	CR		
R 2	" -102	"		
R 3	" -681	"		
R 4	" -471	"		
R 5	" -102	"		
R 6	" -681	"		
R 7	" -561	"		
R 8	" -470	"		
R 9	–	–		
R10	QRD187J-102	CR		
R11	" -152	"		
R12	QVP4A0B-103	VR		
R13	QRD187J-682	CR		
R14	" -101	"		
R15	" -561	"		
R16	–	–		
R17	QRD187J-332	CR		
R18	–	–		
R19	QRD187J-822	CR		
R20	QVP4A0B-471	VR		
R21	QRD187J-821	CR		

Symbol No.	Part No.	Part Name	Description	Q'ty
R22	QRD187J-472	CR		
R23	″ -472	″		
R24	″ -392	″		
R25	″ -472	″		
R26	QVP4A0B-472	VR		
R27	QRD187J-122	CR		
R28	″ -122	″		
R29	″ -222	″		
R30	QRD141K-181	″		
R31	QRD187J-121	″		
R32	″ -331	″		
R33	″ -271	″		
R34	″ -331	″		
R35	″ -391	″		
R36	QVP4A0B-222	VR		
R37	″ -222	″		
R38	QRD187J-102	CR		
R39	QRZ0047-220	Fusible R		
R40	QRD187J-100	CR		
R41	″ -391	″		
R42	″ -223	″		
R43	″ -102	″		
R44	″ -562	″		
R45	″ -102	″		
R46	″ -102	″		
R47	″ -152	″		
R48	″ -272	″		
R49	″ -391	″		
R50	″ -392	″		
R51	″ -391	″		
R52	″ -470	″		
R53	″ -391	″		
R54	QVP4A0B-471	VR		
R55	QRD187J-474	CR		
R56	″ -101	″		
R57	″ -104	″		
R58	″ -222	″		
R59	″ -221	″		
R60	″ -102	″		
R61	″ -102	″		
R62	″ -103	″		
R63	″ -182	″		
R64	″ -153	″		
R65	″ -153	″		
R66	QVP4A0B-102	VR		
R67	QRD187J-102	CR		
R68	″ -102	″		
R69	″ -821	″		
R70	″ -152	″		
R71	″ -121	″		
R72	″ -332	″		
R73	″ -122	″		
R74	QRD141K-561	″		
R75	QRD187J-103	″		
R76	″ -333	″		
R77	″ -122	″		
R78	″ -152	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
R79	QRD187J-221	CR		
R80	" -561	"		
R81	QVP4A0B-223	VR		
R82	QRD187J-154	CR		
R83	" -152	"		
R84	" -273	"		
R85	" -562	"		
R86	" -102	"		
R87	" -102	"		
R88	QRG126J-101	OMF R		
R89	QVP4A0B-223	VR		
R90	QRD187J-222	CR		
R91	" -154	"		
R92	" -102	"		
R93	" -222	"		
R94	" -182	"		
R95	" -391	"		
R96	" -152	"		
R97	" -154	"		
R98	QVP4A0B-223	VR		
R99	QRD187J-821	CR		
R100	" -122	"		
R101	" -153	"		
R102	" -682	"		
R103	" -222	"		
R104	QVP4A0B-682	VR		
R105	QRD187J-223	CR		
R106	" -472	"		
R107	" -103	"		
R108	" -562	"		
R109	" -221	"		
R110	—	—		
R111	" -472	"		
R112	" -222	"		
R113	" -103	"		
R201	QRD187J-391	CR		
R202	" -102	"		
R203	" -391	"		
R204	" -102	"		
R205	" -472	"		
R206	" -222	"		
R207	" -221	"		
R208	" -222	"		
R209	" -472	"		
R210	" -103	"		
R211	" -104	"		
R212	" -105	"		
R213	" -473	"		
R214	" -154	"		
R215	QVP4A0B-222	VR		
R216	" -103	"		
R217	QRD187J-103	CR		
R218	" -103	"		
R219	" -182	"		
R220	" -182	"		
R221	" -221	"		
R222	" -472	"		

Symbol No.	Part No.	Part Name	Description	Q'ty
R223	QRD187J-272	CR		
R224	″ -102	″		
R225	″ -102	″		
R226	″ -393	″		
R227	″ -683	″		
R228	″ -221	″		
R229	″ -222	″		
R230	″ -823	″		
R231	″ -222	″		
R232	″ -563	″		
R233	″ -561	″		
R234	″ -103	″		
R235	″ -393	″		
R236	″ -151	″		
R237	″ -102	″		
R238	QVP4A0B-471	VR		
R239	–	–		
R240	QRD187J-472	CR		
R241	″ -391	″		
R242	″ -391	″		
R243	″ -391	″		
R244	″ -391	″		
R245	″ -391	″		
R246	″ -332	″		
R247	″ -102	″		
R248	″ -152	″		
R249	QVP4A0B-222	VR		
R250	QRD187J-471	CR		
R251	″ -222	″		
R252	″ -221	″		
R253	″ -153	″		
R254	″ -393	″		
R255	″ -103	″		
R256	″ -394	″		
R257	″ -103	″		
R258	″ -102	″		
R259	″ -182	″		
R260	″ -222	″		
R261	″ -104	″		
R262	″ -223	″		
R263	″ -182	″		
R264	″ -333	″		
R265	–	–		
R266	QRD187J-273	CR		
R267	″ -562	″		
R268	QRG126J-151	OMF R		
R269	QRD187J-152	CR		
R270	″ -391	″		
R271	″ -102	″		
R272	″ -122	″		
R273	″ -823	″		
R274	″ -563	″		
R275	″ -561	″		
R276	″ -123	″		
R277	″ -472	″		
R278	–	–		
R279	QRD187J-564	CR		

Symbol No.	Part No.	Part Name	Description	Q'ty
R280	QRD187J-103	CR		
R281	″ -103	″		
R282	″ -222	″		
R283	QVP4A0B-472	VR		
R284	QRD187J-392	CR		
R285	″ -102	″		
R286	″ -182	″		
R287	″ -561	″		
R288	–	–		
R289	–	–		
R290	–	–		
R291	–	–		
R292	–	–		
R293	–	–		
R294	QRD187J-103	CR		
R295	″ -473	″		
R296	″ -392	″		
R297	″ -183	″		
R298	″ -223	″		
R299	″ -103	″		
R300	″ -183	″		
R301	QVP4A0B-103	VR		
R302	QRD187J-223	CR		
R303	″ -562	″		
R304	″ -561	″		
R305	″ -272	″		
R306	″ -393	″		
R307	″ -472	″		
R308	″ -333	″		
R309	″ -152	″		
R310	″ -152	″		
R311	QVP4A0B-102	VR		
R312	QRD187J-822	CR		
R313	″ -183	″		
R314	″ -271	″		
R315	″ -271	″		
R316	″ -222	″		
R317	″ -822	″		
R318	″ -272	″		
R319	″ -102	″		
R320	″ -103	″		
R321	″ -103	″		
R322	″ -221	″		
R323	″ -102	″		
R324	″ -333	″		
R325	″ -103	″		
R326	″ -102	″		
R327	″ -333	″		
R328	″ -103	″		
R329	QRG126J-101	OMF R		
R330	QRD187J-102	CR		
R331	″ -272	″		
R332	″ -272	″		
R333	QRD187J-221	CR		
R334	″ -331	″		
R335	QVP4A0B-222	VR		
R336	QRD187-331	CR		

Symbol No.	Part No.	Part Name	Description	Q'ty
R337	QRD187J-222	CR		
R338	〃 -394	〃		
R339	〃 -332	〃		
C 1	QEW61CA-476	E Cap		
C 2	QEW60JA-107	〃		
C 3	〃 -227	〃		
C 4	QCS31HJ-560	C Cap		
C 5	QEW61CA-476	E Cap		
C 6	QCF31HJ-223	C Cap		
C 7	QEW60JA-476	E Cap		
C 8	QEW61AA-476	〃		
C 9	QEW60JA-476	〃		
C10	QCF31HP-223	C Cap		
C11	QEW60JA-227	E Cap		
C12	〃 -476	〃		
C13	〃 -476	〃		
C14	QEW61HA-105	〃		
C15	QEN41CM-106	NP Cap		
C16	QCS31HJ-270	C Cap		
C17	QEW61CA-106	E Cap		
C18	QCS31HJ-391	C Cap		
C19	QEW61HA-105	E Cap		
C20	QEW61CA-476	〃		
C21	QEW60JA-336	〃		
C22	〃 -476	〃		
C23	QCS31HJ-270	C Cap		
C24	QEW60JA-336	E Cap		
C25	QCS31HJ-471	C Cap		
C26	QEW61CA-476	E Cap		
C27	QCS31HJ-680	C Cap		
C28	QEW60JA-476	E Cap		
C29	〃 -476	〃		
C30	QEW61CA-476	〃		
C31	〃 -476	〃		
C32	〃 -476	〃		
C33	QCF31HP-223	C Cap		
C34	QEW61CA-106	E Cap		
C35	QCS31HJ-820	C Cap		
C36	QFM31HK-103	MY Cap		
C37	QCS31HJ-121	C Cap		
C38	QFM31HK-103	MY Cap		
C39	QCS31HJ-121	C Cap		
C40	QFM31HK-103	MY Cap		
C41	〃 -102	〃		
C42	〃 -103	〃		
C43	〃 -103	〃		
C44	QCS31HJ-101	C Cap		
C45	QFM31HK-103	MY Cap		
C46	〃 -103	〃		
C47	QEW61HA-105	E Cap		
C48	QFM31HK-103	MYCap		
C49	QCF31HP-223	C Cap		
C50	QFM31HK-103	MY Cap		
C51	QCS31HJ-220	C Cap		
C52	QEW61CA-336	E Cap		
C53	QCF31HP-223	C Cap		

Symbol No.	Part No.	Part Name	Description	Q'ty
C54	QFM31HK-103	MY Cap		
C55	″ -103	″		
C56	QEW61AA-477	E Cap		
C57	QCF31HP-223	C Cap		
C58	QEW61CA-107	E Cap		
C59	QEW61EA-475	″		
C60	QCS31HJ-471	C Cap		
C61	QEN41CM-106	NP Cap		
C62	QCS31HJ-390	C Cap		
C63	QEW61AA-476	E Cap		
C64	QEW60JA-476	″		
C65	QEW61EA-475	″		
C66	QEW61CA-106	″		
C67	QEW61AA-476	″		
C68	QCS31HJ-150	C Cap		
C69	″ -391	″		
C70	″ -331	″		
C71	QEW61CA-106	E Cap		
C72	QCS31HJ-100	C Cap		
C73	QEW60JA-476	E Cap		
C74	QEW61CA-476	″		
C75	QEW60JA-107	″		
C76	QEW61AA-476	″		
C77	QEW61CA-336	″		
C78	QFM31HK-103	MY Cap		
C79	″ -103	″		
C80	QEW61CA-336	E Cap		
C81	QCF31HP-223	C Cap		
C82	QFM31HK-103	MY Cap		
C83	QCF31HP-223	C Cap		
C84	″ -223	″		
C85	QFM31HK-103	MY Cap		
C86	QEW61CA-336	E Cap		
C87	QFM31HK-103	MY Cap		
C88	QCF31HP-223	C Cap		
C89	QEW61HA-105	E Cap		
C90	QFM31HK-103	MYCap		
C91	QCF31HP-223	C Cap		
C92	QEW61CA-336	E Cap		
C93	QFM31HK-103	MY Cap		
C94	″ -103	″		
C95	″ -103	″		
C96	QCF31HP-223	C Cap		
C97	″ -223	″		
C98	″ -223	″		
C99	QEW61CA-476	E Cap		
C100	QCS31HJ-121	C Cap		
C101	″ -390	″		
C102	QCF31HP-223	″		
C103	QCS31HJ-301	″		
C104	QEW61HA-105	E Cap		
C105	″ -105	″		
C106	QFM31HK-272	MY Cap		
C107	QFM71HJ-102	″		
C108	QFM31HK-102	″		
C109	QEW61CA-476	E Cap		
C110	″ -106	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
C111	QCF31HP-223	C Cap		
C201	QFM31HK-103	MY Cap		
C202	QEW61CA-106	E Cap		
C203	QFM31HK-333	MY Cap		
C204	" -103	"		
C205	QCS31HJ-680	C Cap		
C206	QFM31HK-123	MY Cap		
C207	QCS31HJ-331	C Cap		
C208	QFM31HK-223	MY Cap		
C209	" -103	"		
C210	QCS31HJ-151	C Cap		
C211	QEW61CA-476	E Cap		
C212	QFM31HK-333	MY Cap		
C213	QCF31HP-223	C Cap		
C214	QFM31HK-223	MY Cap		
C215	" -333	"		
C216	" -103	"		
C217	" -104	"		
C218	QCF31HP-223	C Cap		
C219	QFM31HK-104	MY Cap		
C220	" -103	"		
C221	QCS31HJ-101	C Cap		
C222	QEW61CA-106	E Cap		
C223	QCF31HP-223	C Cap		
C224	QEW61CA-106	E Cap		
C225	QFM31HK-333	MY Cap		
C226	QCF31HP-223	C Cap		
C227	QFM31HK-103	MY Cap		
C228	QEW61CA-106	E Cap		
C229	QCF31HP-223	C Cap		
C230	QFM31HK-103	MY Cap		
C231	QCS31HJ-560	C Cap		
C232	QFM31HK-103	MY Cap		
C233	QCS31HJ-331	C Cap		
C234	QEW61CA-106	E Cap		
C235	QFM31HK-102	MY Cap		
C236	" -103	"		
C237	" -103	"		
C238	QCF31HP-223	C Cap		
C239	QFM31HK-102	MY Cap		
C240	QEW61CA-336	E Cap		
C241	QFM31HK-103	MY Cap		
C242	" -102	"		
C243	QEE41CM-336	T Cap		
C244	QFM31HK-102	MY Cap		
C245	QCF31HP-223	C Cap		
C246	QFM31HK-222	MY Cap		
C247	QCT05UJ-330	C Cap		
C248	–	–		
C249	QCT05UJ-390	C Cap		
C250	QFM31HK-222	MY Cap		
C251	QCT05UJ-150	C Cap		
C252	QCS31HJ-390	"		
C253	QFM31HK-104	MY Cap		
C254	QEW61CA-336	E Cap		
C255	–	–		

Symbol No.	Part No.	Part Name	Description	Q'ty
C256	QEE41CM-335	T Cap		
C257	QFM31HK-102	MY Cap		
C258	QEE41AM-476	T Cap		
C259	QEW61EA-335	E Cap		
C260	QFM31HK-102	MY Cap		
C261	QEW61CA-476	E Cap		
C262	QFM31HK-222	MY Cap		
C263	QCS31HJ-471	C Cap		
C264	QCF31HP-223	″		
C265	QCS31HJ-330	″		
C266	″ -331	″		
C267	″ -560	″		
C268	QFM31HK-103	MY Cap		
C269	QCS31HJ-331	C Cap		
C270	QFM31HK-102	MY Cap		
C271	QEE41EM-105	T Cap		
C272	—	—		
C273	QEW61CA-106	E Cap		
C274	QEW61HA-105	″		
C275	—	—		
C276	QFM31HK-223	MY Cap		
C277	—	—		
C278	—	—		
C279	—	—		
C280	—	—		
C281	—	—		
C282	—	—		
C283	—	—		
C284	QCS31HJ-101	C Cap		
C285	QFM31HK-103	MY Cap		
C286	QCS31HJ-101	C Cap		
C287	QEW61CA-336	E Cap		
C288	″ -336	″		
C289	QEW61EA-475	″		
C290	QFM31HK-152	MY Cap		
C291	″ -682	″		
C292	QCF31HP-223	C Cap		
C293	QCT25CH-101	″		
C294	QCT05UJ-100	″		
C295	QAT3001-008	Trimmer Cap		
C296	QCS31HJ-181	C Cap		
C297	QCT05UJ-820	″		
C298	QCF31HP-223	″		
C299	QEW61CA-476	E Cap		
C300	QFM31HK-103	MY Cap		
C301	″ -102	″		
C302	″ -102	″		
C303	QCS31HJ-470	C Cap		
C304	″ -330	″		
C305	QFM31HK-102	MY Cap		
C306	QCF31HP-223	C Cap		
C307	QFM31HK-102	MY Cap		
C308	QCS31HJ-390	C Cap		
C309	″ -390	″		
C310	QEW61CA-107	E Cap		
C311	QCS31HJ-121	C Cap		
C312	″ -391	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
C313	QCS31HJ-331	C Cap		
C314	QFM31HK-122	MY Cap		
C315	″ -103	″		
C316	″ -103	″		
C317	″ -563	″		
C318	″ -103	″		
C319	″ -103	″		
L 1	A04725-68	Peaking Coil		
L 2	PU46021-101	Choke Coil		
L 3	A04725-100	Peaking Coil		
L 4	″ -56	″		
L 5	″ -18	″		
L 6	″ -100	″		
L 7	″ -33	″		
L 8	″ -47	″		
L 9	″ -56	″		
L10	″ -220	″		
L11	″ -8.2	″		
L12	″ -100	″		
L13	″ -18	″		
L14	″ -5.6	″		
L15	″ -1	″		
L16	PU46021-101	Choke Coil		
L17	A04725-100	Peaking Coil		
L18	″ -100	″		
L19	″ -1200	″		
L20	″ -100	″		
L21	″ -47	″		
L22	″ -100	″		
L201	PU47051-822	Coil		
L202	A04725-100	Peaking Coil		
L203	PU46003-3R9	″		
L204	A04725-100	″		
L205	PU46398-2	Coil		
L206	PU46003-6R8	Peaking Coil		
L207	PU46021-101	Choke Coil		
L208	A04725-39	Peaking Coil		
L209	PU46003-3R9	″		
L210	″ -3R9	″		
L211	–	–		
L212	PU46021-101	Choke Coil		
L213	PU47051-822	Coil		
L214	″ -822	″		
RLC 1	PU46020-3	RLC Block		
LPF 1	PU30192-9D	Low Pass Filter		
LPF 2	PU31932-2	″		
LPF201	PU30192-1D	″		
BPF201	PU30190-6S	Band Pass Filter		
BPF202	″ -6S	″		
BPF203	PU46041	″		
HPF 1	PU30487-4D	High Pass Filter		
DL 1	PU43627C	1-H Delay Line		

Symbol No.	Part No.	Part Name	Description	Q'ty
DL202	PU46321-3	2-H Delay Line		
DF 1	PU30773	Demod. Filter		
EQ 1	–	–		
EQ 2	PU31933	Equalizer		
CF201	–	–		
CT201	PU46042	Ceramic Trap		
X'tal 201	PU46040	Crystal	(4.435571 MHz)	
X'tal 202	PU31449-2	"	(4.433619 MHz)	
	PU43351-3	Cap. Housing	(41–43), (81–83)	2
	" -3Y	"	(71–73)	1
	" -4	"	(31–34), (51–54), (61–64)	3
	" -5	"	(21–25)	1
	" -6	"	(11–16)	1
	PU43092	Collar		8
	A74138-1	Test Pin		35
	PU46006	Shield Case		1
	PU47291	Shield Plate		1
	PU47332	Shield Case		1
	PU31302	PWB Bracket		1
	DPSP3006ZS	Screw		3
	NNS3000NS	Nut		2
	PU42697H	FM Mod. Unit	REF: 1 4	1
	DPSP3006ZS	Screw	For Setting PWB Ass'y	2

11.3.4 PRE & REC PWB ASS'Y 0 5 PU46016D

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	6A753	Integrated Circuit		
IC 2	"	"		
IC 3	18V103	"		
X 1	2SC829C	Transistor		
X 2	"	"		
X 3	2SA564Q	"		
X 4	2SA719R	"		
X 5	2SC1317R	"		
X 6	"	"		
X 7	2SA719R	"		
X 8	2SC1317R	"		
X 9	"	"		
X10	2SC828Q	"		
X11	"	"		
X12	2SC829C	"		
X13	"	"		
X14	2SC1317R	"		
X15	2SA564Q	"		
D 1	OA91	Diode		
D 2	MA150LF	"		
D 3	"	"		
R 1	QVP4A0B-102	VR		
R 2	" -102	"		
R 3	QRD187J-103	CR		
R 4	" -222	"		
R 5	" -222	"		
R 6	" -682	"		
R 7	" -224	"		
R 8	" -273	"		
R 9	" -822	"		
R10	" -561	"		
R11	" -220	"		
R12	" -102	"		
R13	" -102	"		
R14	" -562	"		
R15	" -562	"		
R16	" -102	"		
R17	QRX126J-100	MFR		
R18	QRD181J-4R7	CR		
R19	" -682	"		
R20	" -4R7	"		
R21	" -4R7	"		
R22	" -562	"		
R23	" -180	"		
R24	QVP4A0B-101	VR		
R25	QRD187J-330	CR		
R26	" -272	"		
R27	" -272	"		
R28	" -3R9	"		
R29	" -3R9	"		
R30	" -272	"		
R31	" -272	"		

Symbol No.	Part No.	Part Name	Description	Q'ty
R32	QRD187J-391	CR		
R33	QVP4A0B-103	VR		
R34	″ -103	″		
R35	QRD187J-391	CR		
R36	″ -561	″		
R37	″ -561	″		
R38	″ -273	″		
R39	″ -472	″		
R40	″ -472	″		
R41	″ -273	″		
R42	″ -102	″		
R43	″ -151	″		
R44	″ -151	″		
R45	″ -102	″		
R46	″ -472	″		
R47	″ -472	″		
R48	QVP4A0B-222	VR		
R49	″ -222	″		
R50	QRD187J-221	CR		
R51	″ -182	″		
R52	QVP4A0B-222	VR		
R53	QRD187J-221	CR		
R54	″ -272	″		
R55	QVP4A0B-222	VR		
R56	QRD187J-221	CR		
R57	—	—		
R58	QRD187J-103	CR		
C 1	QCF31HP-223	FC Cap		
C 2	QEW61CA-476	E Cap		
C 3	QFM31HK-223	MY Cap		
C 4	QEW60JA-227	E Cap		
C 5	QFM31HK-223	MY Cap		
C 6	″ -333	″		
C 7	″ -333	″		
C 8	QCS31HJ-100	C Cap		
C 9	QFM31HK-392	MY Cap		
C10	QEE51CM-106	T Cap		
C11	″ -106	″		
C12	QCF31HP-223	C Cap		
C13	″ -223	″		
C14	″ -223	″		
C15	″ -223	″		
C16	—	—		
C17	—	—		
C18	QAT3001-009	Trimmer Cap		
C19	″ -009	″		
C20	QEW61CA-336	E Cap		
C21	QCF31HP-223	C Cap		
C22	″ -223	″		
C23	″ -223	″		
C24	QEW61CA-336	E Cap		
C25	QCF31HP-223	C Cap		
C26	QCS31HJ-151	″		
C27	QCF31HP-223	″		

Symbol No.	Part No.	Part Name	Description	Q'ty
C28	QCF31HP-223	C Cap		
C29	QCS31HJ-151	"		
C30	" -151	"		
C31	" -151	"		
C32	QCF31HP-223	"		
C33	" -223	"		
C34	QEW61CA-336	E Cap		
C35	QCS31HJ-221	C Cap		
C36	QEW61CA-336	E Cap		
C37	QFM31HK-223	MY Cap		
C38	" -223	"		
C39	" -472	"		
C40	" -102	"		
C41	" -223	"		
C42	" -103	"		
C43	QCS31HJ-221	C Cap		
C44	QFM31HK-102	MY Cap		
C45	QCS31HJ-330	C Cap		
C46	QEW61CA-336	E Cap		
C47	QFM31HK-223	MY Cap		
C48	QCF31HP-223	C Cap		
C49	QFM31HK-102	MY Cap		
C50	QCS31HJ-180	C Cap		
L 1	A04725-56	Peaking Coil		
L 2	" -100	"		
L 3	" -47	"		
L 4	" -47	"		
L 5	" -100	"		
L 6	PU40010-102	"		
L 7	A04725-39	"		
L 8	" -82	"		
LPF1	PU30192-1D	LPF		
	PU43351-3	Cap. Housing	(61–63)	1
	" -4	"	(21–24)	1
	" -5	"	(11–15)	1
	" -6	"	(31–36)	1
	PU46013	Shield Case (1)		1
	PU46014	" (2)		1
	PU46015	" (3)		1
	PU43092	Collar	For R17,20,21	6
	A74138	Pin		7
	DPSP3008ZS	Screw	For Setting PWB Ass'y	4

11.3.5 AUDIO & SERVO PWB ASS'Y 0 6 PU46774B

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	AN301	Integrated Circuit		
IC 2	AN318	"		
IC 3	UPD4011C	"		
IC 4	MSM5816	"		
IC 5	UPC1458C	"		
IC 6	AN262	"		
X 1	–	–		
X 2	–	–		
X 3	2SC828Q	Transistor		
X 4	"	"		
X 5	"	"		
X 6	"	"		
X 7	2SA564Q	"		
X 8	2SK40C	F.E.Transistor		
X 9	2SC829C	Transistor		
X10	"	"		
X11	"	"		
X12	"	"		
X13	"	"		
X14	"	"		
X15	2SC1162WTC	"		
X16	"	"		
D 1	MA150LF	Diode		
D 2	"	"		
D 3	"	"		
D 4	"	"		
D 5	"	"		
D 6	"	"		
D 7	"	"		
D 8	"	"		
D 9	"	"		
D10	"	"		
D11	"	"		
D12	"	"		
D13	"	"		
D14	"	"		
D15	"	"		
D16	RD3.9EC	Zener Diode		
D17	MA150LF	Diode		
D18	MA150	"		
D19	MA150LF	"		
D20	"	"		
D21	–	–		
D22	MA150LF	Diode		
D23	"	"		
R 1	QRD187K-472	CR		
R 2	" -103	"		
R 3	" -103	"		
R 4	" -103	"		
R 5	" -102	"		
R 6	" -474	"		

Symbol No.	Part No.	Part Name	Description	Q'ty
R 7	QRD187K-272	CR		
R 8	QVP4A0B-473	VR		
R 9	QRD187K-154	CR		
R10	QVP4A0B-224	VR		
R11	QRD187K-154	CR		
R12	" -220	"		
R13	" -222	"		
R14	" -472	"		
R15	" -222	"		
R16	" -223	"		
R17	" -473	"		
R18	" -223	"		
R19	" -272	"		
R20	" -123	"		
R21	QVP4A0B-473	VR		
R22	QRD187K-123	CR		
R23	QVP4A0B-472	VR		
R24	" -473	"		
R25	QRD187K-333	CR		
R26	" -333	"		
R27	" -103	"		
R28	" -223	"		
R29	" -563	"		
R30	" -563	"		
R31	" -103	"		
R32	" -153	"		
R33	TD5-C220	Thermistor		
R34	QRC141K-825	COM R		
R35	QRD187K-223	CR		
R36	" -223	"		
R37	" -333	"		
R38	" -153	"		
R39	" -274	"		
R40	" -473	"		
R41	" -184	"		
R42	" -475	"		
R43	" -683	"		
R44	" -105	"		
R45	" -183	"		
R46	" -103	"		
R47	" -472	"		
R48	" -103	"		
R49	QVP4A0B-222	VR		
R50	QRD187K-223	CR		
R51	" -472	"		
R52	QVP4A0B-473	VR		
R53	QRD187K-821	CR		
R54	–	–		
R55	QRD187K-103	CR		
R56	" -103	"		
R57	" -104	"		
R58	" -221	"		
R59	" -395	"		
R60	" -225	"		

Symbol No.	Part No.	Part Name	Description	Q'ty
R61	QRD187K-105	CR		
R62	″ -225	″		
R63	″ -104	″		
R64	″ -474	″		
R65	″ -472	″		
R66	QVP4A0B-103	VR		
R67	QRD187K-472	CR		
R68	″ -103	″		
R69	″ -223	″		
R70	″ -223	″		
R71	″ -103	″		
R72	″ -472	″		
R73	″ -224	″		
R74	″ -103	″		
R75	″ -472	″		
R76	″ -224	″		
R77	″ -103	″		
R78	″ -222	″		
R79	″ -393	″		
R80	PU44626	R		
R81	QRW125J-R47	WR		
R82	–	–		
R83	–	–		
R84	–	–		
R85	–	–		
R86	–	–		
R87	–	–		
R88	–	–		
R89	–	–		
R90	–	–		
R91	–	–		
R92	–	–		
R93	–	–		
R94	–	–		
R95	–	–		
R96	–	–		
R97	–	–		
R98	–	–		
R99	–	–		
R100	–	–		
R101	QRD187K-473	CR		
R102	QVP4A0B-223	VR		
R103	QRD187K-122	CR		
R104	QRD121K-271	″		
R105	QRD187K-104	″		
R106	″ -334	″		
R107	″ -103	″		
R108	″ -471	″		
R109	″ -223	″		
R110	″ -103	″		
R111	″ -183	″		
R112	–	–		
R113	QRD187K-103	CR		
R114	″ -272	″		

11.3.7 MECHACON PWB ASS'Y $\boxed{0}\boxed{8}$ PU47405A

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	MSM5830RS	Integrated Circuit		
X 1	–	–		
X 2	–	–		
X 3	2SD636R	Transistor		
X 4	″	″		
X 5	2SD639S	″		
X 6	2SC1162WTC	″		
X 7	2SD636R	″		
X 8	2SD639S	″		
X 9	2SC1162WTC	″		
X10	2SD671T	″		
X11	2SD636R	″		
D 1	1S2473HJ	Diode		
D 2	″	″		
D 3	″	″		
D 4	″	″		
D 5	″	″		
D 6	″	″		
D 7	1S2473	″		
R 1	QRD187J-153	CR		
R 2	″ -153	″		
R 3	″ -105	″		
R 4	″ -331	″		
R 5	″ -104	″		
R 6	″ -223	″		
R 7	–	–		
R 8	QRD187J-472	CR		
R 9	″ -822	″		
R10	″ -822	″		
R11	″ -223	″		
R12	″ -222	″		
R13	″ -562	″		
R14	″ -103	″		
R15	″ -223	″		
R16	″ -223	″		
R17	″ -154	″		
R18	–	–		
R19	QRD187J-102	CR		
R20	″ -682	″		
R21	″ -273	″		
R22	″ -562	″		
R23	″ -333	″		
R24	″ -103	″		
R25	″ -105	″		
R26	″ -221	″		
R27	″ -562	″		
R28	″ -102	″		
R29	″ -475	″		
R30	″ -182	″		
C 1	QFM31HK-473	MY Cap		

Symbol No.	Part No.	Part Name	Description	Q'ty
C 2	QET61CR-106	E Cap		
C 3	QFM71HJ-333	MY Cap		
C 4	QET61HR-335	E Cap		
C 5	QFM31HK-103	MY Cap		
C 6	QET61HR-335	E Cap		
C 7	QET61CR-336	"		
C 8	QFM31HK-103	MY Cap		
C 9	QET61CR-476	E Cap		
C10	" -106	"		
C11	QET61HR-335	"		
C12	QET61CR-336	"		
	PU43351-3R	Cap. Housing	(61–63), (161–163)	2
	" -3	"	(31–33), (41–43)	2
	" -6	"	(11–16)	1
	" -10	"	(21–30)	1
	DPSP3008ZS	Screw	For Setting PWB Ass'y	2

11.3.8 OPERATION PWB ASS'Y $\boxed{0}\boxed{9}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	QSM1S01-014	Microswitch		5
	PU31277	Operation P.W.B.		1

11.3.9 FUNCTION PWB ASS'Y $\boxed{1}\boxed{0}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	AX49327	Lever SW Ass'y		
	A19086-B1	P. SW P.W.B.		
	QLP3104-107B	Lamp	Power Lamp	

11.3.10 INPUT SELECT SW PWB ASS'Y $\boxed{1}\boxed{1}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44611	Lever SW Ass'y		
	PU44660	I. SW P.W.B.		
RFC-1	QQL043K-101	Peaking Coil		

Symbol No.	Part No.	Part Name	Description	Q'ty
R115	QRD187K-333	CR		
R116	〃 -223	〃		
R117	QVP4A0B-223	VR		
R118	QRD187K-682	CR		
R119	〃 -152	〃		
R120	〃 -221	〃		
R121	〃 -103	〃		
R122	〃 -102	〃		
R123	〃 -223	〃		
R124	〃 -222	〃		
R125	〃 -103	〃		
R126	QVP4A0B-682	VR		
R127	QRD187K-152	CR		
R128	QVP4A0B-103	VR		
R129	QRD187K-223	CR		
R130	〃 -102	〃		
R131	〃 -101	〃		
R132	〃 -223	〃		
R133	〃 -125	〃		
R134	〃 -155	〃		
R135	QRX126J-5R6	MF R		
R136	QRD187K-682	CR		
R137	〃 -473	〃		
R138	〃 -223	〃		
R139	〃 -103	〃		
R140	〃 -102	〃		
R141	〃 -222	〃		
R142	QRG126J-150	OMF R		
R143	〃 -150	〃		
R144	QVP4A0B-683	VR		
R145	QRD187K-102	CR		
R146	QRD183K-223	〃		
C 1	QFZ0021-102	MY Cap		
C 2	〃 -102	〃		
C 3	〃 -102	〃		
C 4	QCS31HJ-680	C Cap		
C 5	〃 -471	〃		
C 6	QEW61AA-476	E Cap		
C 7	QEW61HA-105	〃		
C 8	QCS31HJ-101	C Cap		
C 9	QEW61HA-474	E Cap		
C10	QEW61CA-476	〃		
C11	QFZ0021-123	MY Cap		
C12	〃 -104	〃		
C13	〃 -124	〃		
C14	〃 -102	〃		
C15	〃 -102	〃		
C16	QEW61CA-106	E Cap		
C17	QEW60JA-227	〃		
C18	QFZ0021-222	MY Cap		
C19	〃 -103	〃		
C20	〃 -103	〃		
C21	QEW61CA-476	E Cap		
C22	〃 -476	〃		

Symbol No.	Part No.	Part Name	Description	Q'ty
C23	QEW61CA-106	E Cap		
C24	QFZ0021-103	MY Cap		
C25	〃 -563	〃		
C26	〃 -103	〃		
C27	〃 -563	〃		
C28	〃 -124	〃		
C29	〃 -102	〃		
C30	〃 -273	〃		
C31	〃 -393	〃		
C32	〃 -224	〃		
C33	QEE41CM-106	T Cap		
C34	QEW61HA-105	E Cap		
C35	QEW61CA-476	〃		
C36	QCF11HP-473	C Cap		
C37	QEW61EA-475	E Cap		
C38	QFZ0021-124	MY Cap		
C39	〃 -103	〃		
C40	〃 -103	〃		
C41	QEE41CM-475	T Cap		
C42	QEN41HA-105	NP Cap		
C43	QFZ0021-104	MY Cap		
C44	〃 -223	〃		
C45	QEW61CA-106	E Cap		
C46	〃 -106	〃		
C47	〃 -106	〃		
C48	〃 -106	〃		
C49	QFZ0021-102	MY Cap		
C50	QEW61CA-106	E Cap		
C51	QFZ0021-822	MY Cap		
C52	QEW61AA-476	E Cap		
C53	QFZ0021-102	MY Cap		
C54	QEW61CA-107	E Cap		
C55	QCS31HJ-561	C Cap		
C56	QFZ0021-683	MY Cap		
C57	QEW61CA-106	E Cap		
C58	〃 -106	〃		
C59	QEW61HA-105	〃		
C60	QEW61CA-106	〃		
C61	〃 -227	〃		
C62	〃 -476	〃		
C63	〃 -106	〃		
C64	QEW61HA-105	〃		
C65	〃 -474	〃		
C66	QCS31HJ-391	C Cap		
C67	QEW61HA-105	E Cap		
C68	QCS31HJ-681	C Cap		
C69	QEW61HA-105	E Cap		
C70	〃 -105	〃		
C71	QFZ0021-473	MY Cap		
C72	〃 -104	〃		
C73	QEW61AA-476	E Cap		
C74	QEW61EA-475	〃		
C75	QFZ0021-102	MY Cap		
C76	QEW61CA-107	E Cap		

Symbol No.	Part No.	Part Name	Description	Q'ty
C77	QEW61CA-476	E Cap		
C78	QEN41CA-475	NP Cap		
C79	QEW61CA-107	E Cap		
C80	QFZ0021-103	MY Cap		
C81	" -103	"		
C82	" -103	"		
C83	QCS31HJ-561	C Cap		
C84	QFP32XK-272	PP Cap		
C85	" -392	"		
C86	QFZ0021-103			
L 1	A04725-330	Peaking Coil		
L 2	PU30771-5	Coil		
L 3	A04725-2700	Peaking Coil		
OS 1	PU46776C	Ceramic Osc.		
T 1	PU30961	Osc. Transformer		
S 1	PU47001	Slide Switch		
S 2	PU47002	"		
	QLP3104-107B	Lamp	(Recording Lamp)	1
	PU43351-3	Cap. Housing	(21–23) (31–33) (61–63) (71–73) (81–83) (131–133)	6
	PU43351-3R	"	(91–93) (101–103)	2
	" -6	"	(11–16)	1
	" -7	"	(141–147)	1
	" -9	"	(151–159)	1
	" -106	"	(111–116)	1
	" -3Y	"	(41–43) (51–53)	2
	PU43092	Collar		8
	A74138-1	Test Pin		21
	DPSP3008ZS	Screw	For Setting PWB Ass'y	2

11.3.6 JUNCTION PWB ASS'Y 0 7

Symbol No.	Part No.	Part Name	Description	Q'ty
X 1	2SC829C	Transistor		
D 1	VO3C	Diode		
D 2	"	"		
D 3	MA150LF	"		
D 4	"	"		
D 7	MA150	"		
R 1	QRG016J-151	OMF R		
R 2	QRD142K-123	CR		
R 3	" -182	"		
R 4	" -102	"		
R 5	QRG016J-680	OMF R		
R 6	QRD142K-102	CR		
R 7	" -184	"		
R 8	PU45352	Thermistor		
R 9	QRD142K-273	CR		
R10	" -184	"		
R11	PU45352	Thermistor		
R12	QRD142K-273	CR		
R13	–	–		
R14	QRD143K-822	CR		
R15	QRD142K-102	"		
R16	QRG016J-151	OMF R		
R17	QRD181J-102	CR		
C 1	QEW21EA-228	E Cap		
C 2	QEW41CA-476	"		
C 3	QET21HR-474	"		
	PU43351-103	Cap. Housing	(61–63)	1
	" -104	"	(51–54)	1
	" -6	"	(71–76)	1
	A75802-5	"	(1–R)	1
	PU43092	Collar		6
	A74138-1	Pin		1
	A74017	Tab		4
	A49796	Pin		1
	PU45908-2	Test Pin	(V. OUT)	1

11.3.11 FM MOD UNIT PWB ASS'Y 1 4 PU42697H

Symbol No.	Part No.	Part Name	Description	Q'ty
X 1	2N2369	Transistor	Note: As FM Mod. Unit Ass'y is completely adjusted at our factory, please change them by unit ass'y in case of repair.	
X 2	"	"		
T 1	PU30769	FM Mod. Trans.		
R 1	QVP4A0B-102	VR		
R 2	QRD143K-182	CR		
R 3	" -182	"		
R 4	" -151	"		
R 5	" -331	"		
R 6	" -682	"		
R 7	" -682	"		
R 8	" -331	"		
R 9	" -181	"		
C 1	PU30767-220	Feed Through Cap		
C 2	QCT05CH-470	C Cap		
C 3	" -390	"		
C 4	QAT3001-015	Trimmer Cap		
C 5	PU30767-102	Feed Through Cap		
C 6	QEW41HA-105	E Cap		
C 7	PU30767-220	Feed Through Cap		
L 1	A04096-100	Peaking Coil		
	PU42674	Shield Case		1
	PU42675-2	"		1
	PU42675-3	"		1
	PU42696A	S. Case Cover Ass'y		1

11.3.12 HEATER PWB ASS'Y 1 5

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44689	Heater P.W.B.		1
	PU44624	T. Lead SWitch		1
	A74138	Pin		6

11.3.13 A.E. & A/CTL HEAD P.W.B. 1 6

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU46436	Head P.W.B.	PU44681 is misprint.	1

11.3.14 FULL ERASE HEAD PWB ASS'Y 1 7

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44742	F.E.H. P.W.B.		1

11.3.15 START SENSOR PWB ASS'Y $\boxed{1}\boxed{9}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU46394	Supply Photo Transistor Board		1
	PN202S	Photo Transistor		1
	PU46395	Shade		1

11.3.16 END SENSOR PWB ASS'Y $\boxed{2}\boxed{0}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44679	T.U. Photo Transistor P.W.B.		1
	PN202S	Photo Transistor		1
	PU44897	Shade		1

11.3.17 T.U. SENSOR & SEARCH P.W.B. $\boxed{2}\boxed{1}$

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	DN835	Hall I.C.		
D 1	RD5.1E	Zener Diode		
R 1	QRD122K-331	CR		
R 2	QRD142K-471	"		
C 1	QCF31HP-103	C Cap		
	PU44666	T.U. Sens. P.W.B.		1
	PU43802	IC Clamp		1

11.3.18 POWER TR P.W.B. (REGULATOR) $\boxed{2}\boxed{2}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44741	Power Transistor P.W.B.		1
X 1	2SD3890	Transistor		
X 2	"	"		
	(PU45375-1)	Spacer	] included 2SD3890	2
	(PU41624-6)	Insulator		2
	LPSP3008ZS			1

11.3.19 POWER TR P.W.B. (A/S) $\boxed{2}\boxed{3}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44741	Power Transistor P.W.B.		1
X 1	2SD3890	Transistor		
X 2	"	"		
	(PU45375-1)	Spacer	] included 2SD3890	2
	(PU41624-6)	Insulator		2
	LPSP3008ZS	Screw		1

11.3.20 TERMINAL PWB (VIDEO HEAD) ASS'Y $\boxed{2}\boxed{4}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	PU44674	Terminal P.W.B.		1

11.3.21 TIMER PWB ASS'Y $\boxed{2}\boxed{5}$

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 1	SC3044	LSI		1
LED 1	PU47057	LED Display		1
X 1	2SC2021R (or S)	Transistor		
X 2	2SA786Q (or R)	"		
X 3	2SC1384S	"		
X 4	2SC2021R (or S)	"		
X 5	"	"		
D 1	AU01-07	Zener Diode		
D 2	"	"		
D 3	VO3C	Diode		
D 4	"	"		
D 5	RD6.2EB	Zener Diode		
D 6	1S2473VE	Diode		
D 7	"	"		
D 8	"	"		
D 9	1S2473	"		
D10	"	"		
R 1	–	–		
R 2	–	–		
R 3	QRD143K-471	CR		
R 4	QRD183J-103	"		
R 5	" -103	"		
R 6	" -103	"		
R 7	" -103	"		
R 8	" -392	"		
R 9	" -473	"		
R10	" -473	"		
RA 1	PU47058	Resistor Array		1
C 1	QEW61CA-106	E Cap		
C 2	QFM41HK-103	MY Cap		
C 3	QEE41AM-226	T Cap		
C 4	QEE41EM-105	"		
	PU43351-6	Cap. Housing		1
	PU45380-3	"		1
	GK-35050	C. Mark		4
	PU47037	Test Pin		
	PU47462	IC Socket		1
	PU47034	Push Switch	S1–S6	6

11.3.22 CH SELECTOR PWB ASS'Y $\boxed{2}\boxed{7}$ VH8002B2

Symbol No.	Part No.	Part Name	Description	Q'ty
IC 91	UPC574J	Integrated Circuit		
D 1	GL-3PG2	L.E.D.		
D 2	"	"		
D 3	"	"		
D 4	"	"		
D 5	"	"		
D 6	"	"		
D 7	"	"		
D 8	"	"		
R 1	QRD142K-152	CR		
R 2	" -152	"		
R 3	" -152	"		
R 4	" -152	"		
R 5	" -152	"		
R 6	" -152	"		
R 7	" -152	"		
R91	AX49296-1.5	OMR		
C 1	QEW61HA-474	E Cap		
S 1	QSP0280-001	Push Lock SW	(S1–S8)	8
	A75761	Heat Sink		1
	PU43351-3	Cap. Housing		1
	" -4	"		4
	" -5	"		1
	A75514-5	Lebel		1

11.3.23 PRE SETTER P.W.B. ASS'Y $\boxed{2}\boxed{8}$ VH8502A

Symbol No.	Part No.	Part Name	Description	Q'ty
	AA06A401	P.M. Block Ass'y		1
S51	QSM1S01-014	Micro SW.		1
	C39002-A1	P.W. Board		1

11.3.24 TERMINAL PWB ASS'Y (TUNER) $\boxed{2}\boxed{9}$

Symbol No.	Part No.	Part Name	Description	Q'ty
	A75979-A4	Terminal P.W.B.		1
R 3	QRD142K-2R7	CR		
C 1	QEW51CA-106	E Cap		
C 2	QEW51CA-107	"		
C 4	QEW51HA-105	"		

11.3.25 MODE SELECT PWB 3 0

Symbol No.	Part No.	Part Name	Description	Q'ty
	A75980-B5	Mode Select P.W.B.		1
	QRD142J-681	CR		1